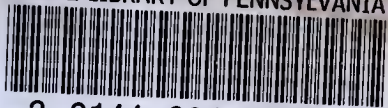


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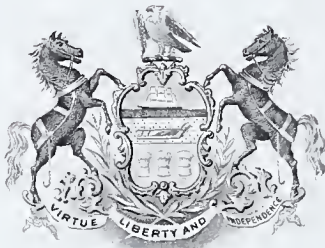


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JOURNAL
OF THE
AMERICAN PEAT SOCIETY

A QUARTERLY JOURNAL DEVOTED TO THE DIFFUSION OF KNOWLEDGE OF THE UTILIZATION OF PEAT, AND THE DEVELOPMENT OF AMERICAN PEAT RESOURCES.

VOLUME IV
APRIL, 1911, to JANUARY, 1912.

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THE PRODUCTION AND USE OF PEAT FUEL.

A Lecture Given to the Modern Science Club, Brooklyn, N. Y.,
Oct. 25, 1910, By A. R. Maujer, New York.

Peat is a combustible substance produced under certain conditions by the slow decay of vegetable matter. The character of peat depends upon the condition prevailing during this decay and on the nature of the vegetation from which it is formed. To the peat-forming vegetation belong nearly all of the mosses, heath plants, water and swamp plants, such as rushes, sedges and grasses, trunks and roots of trees, etc.

In order that slow decomposition may take place, free access of air to the dead vegetation must be prevented, else oxidation will accompany the decay and ultimately only inorganic substances will remain.

The formation of peat is dependent upon a special combination of climatic and topographical conditions. The principal factors are:

- (1) Growth of aquatic and moisture loving plants.
- (2) A soil or sub-soil which will retain water at the surface.
- (3) Sufficiently humid atmosphere to prevent too rapid evaporation.
- (4) A temperature high enough to allow a profuse growth of vegetation, yet low enough to check too rapid a decay of vegetable matter.

Bogs generally occur in shallow depressions having a clay bottom, or, when the water rests on permeable matter like sand this overlies an impermeable sub-soil. The water must be still, but not stagnant nor subject to the influences of rapid currents of water. Hence, the bogs generally originate in

lacustrine areas, which gradually become filled up with silt and aquatic plants and so become fitted for the vegetation characteristic of peat. As a consequence of this, bogs are most prevalent in lowland districts, but they may occur in mountainous countries when drainage is impeded so as to form local accumulations of water.

Humidity is a very important regulator of the distribution of bogs. Wooded moors favor the growth of mosses, owing to the air there being more moist than in the open country. Hence it is that the bogs in low-lying areas seldom have trees buried in them, whereas in mountain bogs trees are plentiful, the growth of the moss being favored by the fallen trunks damming back the water so as to form pools.

Peat bogs are generally classified as high bogs and low bogs. The vegetable matter forming high bogs is principally made up of mosses, heath plants and forest residue. On account of the moisture absorbing property of the mosses in particular, these bogs are like enormous sponges, retaining large quantities of water, which furthermore favors the growth of this vegetation. Under favorable conditions these bogs may attain considerable depth, especially in their central parts, where the drainage is slight and the growth of the moss is most profuse. In many instances these parts are on a higher level than the rest of the bog and often from 15 to 50 feet or more in depth.

The vegetable matter forming low bogs is made up of plants requiring more nourishment than the plants of the high bogs. The principal vegetation on low bogs comprises grasses, sedges, reeds and rushes. Low bogs chiefly occur in regions which are occasionally or periodically flooded.

In a great number of cases the conditions under which a bog has been formed have changed from time to time, resulting in different vegetation and in peat of different qualities. Bogs of this nature are classified as mixed bogs.

The different classes of peat are divided into two large groups—moss peat and grass peat. The chief products from moss peat are, litter or live stock bedding, paper, filling and packing materials, insulating material, alcohol, fertilizer and in some cases, fuel, although from its porous nature, it is bulky, especially difficult to dry and if handled dry, falls to pieces easily.

The grass peats make the best fuel. They are heavy and compact and dry with comparative rapidity. As a fuel, peat from its nature may be classified between wood and lignite.

Peat is found in practically all parts of the world but particularly in the temperate zone. Holland has been using peat as fuel for centuries. Her present yearly consumption is

something over a million tons. Russia produces over four million tons annually. It is estimated that there are upward of 11,000 square miles of peat bogs in the United States, exclusive of Alaska. In Canada an estimate based on a survey which is only partially complete, places the bog area there at over 37,000 square miles.

While the peat-fuel industry in Europe is highly developed at the present time, no very great progress has been made with it on this continent although desultory attempts to develop a commercial industry have been made for 30 years or more. At one time peat bricks were used by the Grand Trunk R. R. for fuel on its locomotives, but the company which manufactured the fuel was unable to gain financial success and went out of business.

Among the factors which have prevented the growth of a successful peat-fuel industry on this continent are:

- (1) Lack of knowledge of the characteristics of peat.
- (2) Lack of suitable machinery to handle it.
- (3) High cost of labor as compared with the cost in Europe.
- (4) Low cost and abundance of other fuels such as the coal and wood.

The first factor, lack of knowledge, is rapidly being eliminated. Study of the problems confronting successful peat fuel manufacture is being carried forward in a more rational way than formerly and by an ever increasing number of men.

The elimination of the second factor, lack of suitable machinery, naturally keeps step with the elimination of the first factor. Originally, attempts to devise peat machinery were based on scant knowledge of the requirements and it is but small wonder that practically all of them were dismal failures. Then, too, each successive inventor scorned to profit by the experience of former ones and insisted upon following out his own ideas regardless of the fact that the experience of others had proved them to be fundamentally wrong. However, with increased knowledge of the characteristics of the material, with continually increasing experience from which to draw, and with a rational policy of employing such principles as have been proven to be correct, the want of adequate machinery is fast being supplied.

The influence of the third factor, high cost of labor, will be nullified partly by the use of automatic machinery and partly by the continual rise in the cost of other fuels, the present comparatively low cost of which constitutes the fourth and last of the factors which I have enumerated.

Assuming that the time has arrived when peat fuel can be

prepared at a cost which makes it a commercial competitor of coal, what is the most logical way in which to utilize it for power generation? As a token that my assumption is not too far from actual achievement I will, a little later on, show a few cost data obtained from the Canadian Government's experimental plants at Alfred, Ontario. And in answer to the question, what is the most logical way in which to utilize the peat for power generation, I will give you the opinion expressed by Dr. T. Arthur Mighill at the annual meeting of the American Peat Society last summer.

Dr. Mighill's opinion after making a practical study of peat problems for several years past, is, in brief, as follows:

"As peat is a fuel of low calorific value, averaging from 6,000 to 9,000 B. t. u. per pound of dry substance, one pound of good coal is equal to $1\frac{1}{2}$ to 2 pounds of average peat. Although peat when burned under a boiler will generate steam, the quantity required is nearly twice that of coal, so that a larger grate area is required and the fuel must be more frequently fired. The ashes are light and can easily be removed. The flame is long and should put the heat where it will do the most good, in the tubes. From its light and pulverent nature, when the draft is forced, considerable fuel might find its way into the stack before complete combustion.

For small plants it may not be practical or desirable to use a gas producer and engine on account of the simplicity of operation of a steam boiler and engine. I am advocating the use of the gas producer and engine in large plants not on account of any difficulty in using peat as a steam-boiler fuel but on account of the higher heat efficiency of the gas engine.

In contemplating the use of peat as a source of power we must consider the economic conditions connected with the locality. We must consider the price of coal at the locality and the cost of preparing peat fuel. The farther the bog is from the coal fields the greater the possibilities of the peat proposition. The matter ends here if the power is to be used for factory purposes, but if electrical energy is to be sold, consideration must be given to the situation of the bog relative to the community to be served. As electricity can easily be transmitted over a considerable distance, the bog may be some distance from the region served, but the generating plant must be at the bog. Freight charges must be eliminated.

The preparation of peat for use as fuel consists of digging the peat, drying it and storing it. The gasification of it is the most important process of the series. I have made considerable inquiry as to whether peat will clinker badly in a producer but have received no satisfactory answer. In a

series of experiments at Pittsburg I found some clinkers, but I cannot say that they were any worse than those formed by coal. From the fineness of the ash I judge that the possibilities of forming a large amount of clinker are not very great. However, if the peat is too finely divided the draft will form holes and here the combustion will be most intense, favoring clinker formation. The lightness and porosity of peat is a drawback, for the combustion may be so rapid in places that holes or "chimneys" are formed. This necessitates considerable poking of the fire and every poke of the iron is likely to make a path for the air. The lightness of the fuel and the low heat value greatly increase the size of the peat producer over a coal-gas producer of the same power capacity.

The content of water in air-dried peat makes the operation of a producer uncertain, for to my mind there is quite a difference between running steam through incandescent coke, as in an anthracite producer, and using the steam liberated in the fuel bed itself at a rate which, from the nature of the operation, must be irregular. Under such conditions the producer may run sometimes too hot and sometimes too cool and the heat value of the gas may vary greatly.

This raises the question, how much water can peat contain and be used successfully in a producer? This can be determined only by long tests of fuels containing various quantities of moisture, not by such short runs of which accounts are available. It has been said that peat containing as much as 50 per cent. can be used in a producer. If this were true it would cut down the drying expense very much, but I believe that 30 to 35 per cent. of moisture is about the limit that can be allowed.

The evaporation of water in a producer only to have it condense again unaltered is inexcusable unless we are going to recover ammonia, as in the Mound process, or else find some compensation in the preparation of the fuel whereby the producer is worked extra to save the drying field. It has been shown that to attempt to recover by-products, except in plants of about 3,000 horse power and over, is impracticable.

If the temperature of the producer gets too low, as through the evaporation of too much water, the carbonic acid is not decomposed and the heat value of the gas is correspondingly lowered.

The form in which the fuel is applied is of great importance. There are records of runs in this country where machine peat and briquetted peat were used. There should be no trouble in using briquets but I believe that the expense of manufacturing them does not warrant their use, and I con-

sider properly machined peat just as good. I am not a believer, however, in the idea that a producer can be run on anything that is combustible.

In a run of about two weeks, at Pittsburg, it was found that peat dug out of the bog and not machined but thrown on the ground to dry did not make a fuel suitable for producer purposes. We did not dig the peat out in blocks as is sometimes done in Europe, but dumped a car load of fresh peat on the ground and spread it out to a thickness of several inches. The dried peat was shipped by rail from Massachusetts to Pittsburg. In all, it was shoveled over about ten times before it was burned in the producer. The result was that there was so large a percentage of "fines" in it that the draft through the producer was greatly restricted, and the suction rose so high that the operation of the producer became a source of danger. As a result we got poor gas, high in carbonic acid.

To operate a producer successfully on peat the fuel must be prepared by machining it and drying it so that it hardens into lumps and does not produce much fines when handled.

Reports of producer tests show a consumption of from $1\frac{1}{2}$ to $2\frac{1}{2}$ pounds of dry peat per horse power hour. Suppose the average is two pounds, containing, say, 9,000 B. t. u. per pound, which would represent an excellent quality of peat. As it is impractical to use perfectly dry peat, more pounds of less heat value must be used. Assuming that the peat contains 33 per cent. of moisture, which seems to be the most practical state of dryness to attain, the two pounds of dry peat would be increased by one pound of water, making three pounds of wet peat necessary to develop one horse power hour. This would require excavating from the bog 240 tons of raw peat, with a content of 90 per cent. of moisture, each 24 hours to keep up a supply of 1,000 horse power. Bog peat has about the same weight as water, that is $62\frac{1}{2}$ pounds per cubic foot. I am assuming a bog undrained or imperfectly so, as the density of peat increases with the dryness of the bog.

An acre of such a bog would furnish 1,360 tons of raw peat for each foot of depth, which, with 90 per cent. moisture, would yield 136 tons of dry peat, equivalent to 204 tons of peat containing 33 per cent. of moisture. Since a 1,000 horse power plant would consume 35 tons of fuel per day, one foot-acre of peat would last about 6 days, and a square mile one foot deep would last about ten years. These figures are based on an average, not a maximum, output of 1,000 horse power per each 24-hour day.

Climatic conditions have so great an influence upon the drying of peat that it is impossible to say how long peat must

be laid out in order to dry sufficiently. I think that the season in the northern United States and Canada can hardly exceed six months and will in most places probably be less, unless the locality is one with slight rainfall. If the drying period is six months, then during that time the fuel for the whole year must be prepared. In the case of the plant of 1,000 horse power average output there would have to be prepared each day 72 tons of fuel, with 33 per cent. of moisture.

Most important is the time necessary to dry the peat. This varies with the extremes and middle of the season, setbacks by rain, heavy dews and possible frosts; on the average, peat properly laid out may reach the necessary degree of dryness in from two to three weeks if it be not spread too thickly. As my object is not so much to show what has been done in specific localities, but to show the conditions attending a peat-power proposition, I will assume that the drying field, whether bog or upland, will be covered to an average depth of 4 inches and that the peat will be lifted every three weeks throughout the season of six months.

One acre of drying ground carried to a depth of 4 inches would contain 453 tons of fresh peat having 90 per cent. of moisture, or 68 tons of air-dried peat of 33 per cent. moisture. The acre of drying ground would be covered 9 times in six months and the fuel produced per acre per season, that is, for the year, would be slightly over 600 tons.

The 1,000 horse power plant requires 36 tons of fuel per day or 13,140 tons per year. It would therefore, require 22 acres of drying ground or not quite 1-30 of a square mile. I think that in most places this area would hardly be sufficient. Should the peat be laid out in cakes the space would be somewhat increased by the vacant spaces between the cakes, unless the cakes be made correspondingly larger. Peat in this form would dry quicker than in sheets and the efficiency of the ground would probably be much increased.

Experience has shown that the use of drying shelves is out of the question in handling such quantities of peat on account of the cost and deterioration of the lumber. Further, it is not an easy matter to fill the shelves and unload them mechanically.

Two other ways of removing the water from peat are often suggested, pressing the water out and evaporating it by artificial heat. I would not say that peat presses are impracticable, but I do not think that the inherent difficulties have been overcome yet. It requires fine screens to hold the peat and great pressure to force the water out. Filter presses or machines of this type work too slowly to handle peat in large

quantities. The requirements of a peat press are continuous and rapid operation, great strength, and screens that will not clog up and yet will hold the peat from passing through.

To remove a small percentage of the water would not be worth while using a press. However, if half of it could be removed by a press, it would be profitable to do this and subsequently air-dry the peat. The waste heat from the producer and the exhaust gases from the engines might be utilized in some way to finish the drying of the peat. The exhaust gases might be passed through the drying house, but the waste heat from the producers could not easily be utilized because it would require an enormous amount of piping, as the hot gases at this stage must be confined.

As half a year's fuel must be stored for the winter, it is evident that the storage plant must be quite large on account of the amount stored and its bulky nature. For the plant delivering an average of 1,000 horse power continuously, about 6,500 tons must be stored, and as a cubic foot of peat fuel weighs about 25 pounds, the volume occupied by 6,500 tons is about 520,000 cubic feet.

Storage bins can be constructed so that even during the winter the peat will continue to dry.

By using machinery, peat fuel ought to be manufactured for \$1 per ton or less. If so, it can compete with coal at \$2 a ton.

So much for Dr. Mighill's analysis of the peat fuel problem.

The coal deposits of Canada are all located in the western and eastern portions of the country; practically no coal is found in the central parts. The anthracite which is used in the central provinces is obtained from the Pennsylvania districts. Because of expense of transporting it such a great distance the cost is high. In Ontario and Quebec anthracite of very ordinary grade costs \$7.50 per ton; in Manitoba the cost is as high as \$10. For these reasons a satisfactory substitute for coal which could be made to compete with it commercially would find a ready market and the Canadian Government, recognizing the economic possibilities in a thriving peat-fuel industry, is endeavoring to stimulate the interest and enterprise of bog owners and manufacturers by demonstrating that peat fuel can be produced cheaply and that power for industrial purposes as well as heat for domestic use can be obtained therefrom. To accomplish this a portion, comprising about 300 acres, of what is known as the Alfred bog has been acquired and fuel is being manufactured. The peat is used at the Canadian Government's fuel-testing station in a peat producer-

gas plant of 60 horse power capacity. The bog is situated about 40 miles east of Ottawa in Prescott County, Province of Ontario. It covers an area of approximately 6,800 acres. The peat varies in depth from 3 to 17 feet. That the peat of the Alfred bog is suitable for fuel is shown by the analysis which was obtained from Bulletin No. 4, issued by the Canadian Department of Mines.

Analysis of Peat from Alfred Bog. Absolutely Dry.

	Per cent.
Volatile Matter	68.23
Fixed Carbon	26.00
Ash.	5.77
Nitrogen	1.76
Sulphur.	0.218
Phosphorous	0.033
Calorific Value in B. t. u.....	9005

Before actual manufacturing operations were started at the Government bog about 24,000 linear feet of drainage ditches were run late in the summer of 1909. This required the excavation of about 9,300 cubic yards. The excavating was done entirely by hand and cost approximately 8½ cents per cubic yard.

While the ditches were being dug an Anrep peat machine which has attained considerable success in Europe, and other machinery was purchased, brought to the bog and made ready for operations, which were started in the summer of the present year. The machine has a capacity of about 30 tons per day.

The manner in which the peat is dug and handled is as follows: The men work at different levels so as to secure uniformity in the composition of the peat after it has passed through the machine. The peat is dug out with large sharp-edged spades and thrown onto the elevator. At the upper end the peat falls off into the hopper of the mixing machine in which all roots and stems are cut into small pieces and the peat is so thoroughly mixed that it resembles a pulp when it emerges. The cutting is accomplished by a number of knives mounted on a shaft which revolves at a speed of about 260 revolutions per minute. These knives pass sets of stationary knives which are fixed to the interior surface of the casing. A number of broad helix-shape blades mounted on the same shaft do the mixing and force the peat out of the mouth of the machine and onto a belt conveyor. The peat falls from the end of this conveyor into small steel dump cars which are hauled to and from the drying field by an endless cable. The

cars travel on light portable steel tracks which are laid down on the roughly leveled surface of the bog.

The cable is moved by drums controlled by levers. The cable is gripped by the car by means of a clamp attached to the car truck. The upper of the pair of jaws forming the clamp or clutch, is raised and lowered by a cam and weighted lever. When the upper jaw is raised the cable rides on a grooved roller mounted on a spindle in the middle of the lower jaw and does not come in contact with either of the jaws. When the lever is thrown over the weight holds the movable jaw down and the cable is firmly gripped. The boiler and engine are built integral with each other and are made as light and compact as is consistent with durability. The rated capacity of the engine is 35 horse power. The boiler is fitted with a grate suitable for burning either peat or brushwood. The entire outfit is mounted on a steel frame which is carried on car wheels. When it is necessary to move the apparatus it is warped along over ordinary steel rails by means of a cable which runs through a pulley attached to an anchor and is wound over a slowly moving geared drum on the machine.

When a car full of peat arrives at the drying field, one man disconnects the grip and dumps the peat from the car into a Jakobson field press which travels along the side of the tracks. The press consists of a wooden frame in the front, part of which travels on a wide wooden roller. The peat is roughly spread out on the ground within this frame by two men. The rear part of the frame is covered. Under the cover there is another wide wooden roller, which is set about 5 inches above the surface of the ground and is rotated by the front roller to which it is connected by chains located at the sides of the frame. The roller and frame press the peat out into a smooth flat strip about 6 feet wide and 5 inches deep. The back of the frame carries a set of 14 wooden knife blades which are held down by as many weights. The knives divide the strip of peat into 15 ribbons of equal width. These are cut crosswise into lengths of about 12 inches with suitable circular knives by the man who empties the car. The object of cutting the peat up in this way is to hasten the drying by exposing more surface to the air. The press is slowly dragged along at the desired speed by a cable wound over a drum at the engine.

The peat is allowed to lie undisturbed for 7 days or longer, depending on climatic conditions, until it is firm enough to be turned over. After it is turned the peat is allowed to remain on the field for about 10 days longer. It is then stacked. Each slab is spaced an inch or two away from its neighbors so that

air may circulate through the stack and continue the drying process. The peat which is to be carried in stock for any length of time is removed from the stacks after about 30 days and placed in a storage shed of cheap, wood construction, 160 feet long and 22 feet wide and 18 feet high.

Thirteen men and three boys are required to dig, machine and spread the peat. The men are paid \$1.75 per day and the boys \$1. This makes a total cost of \$25.75 per day to lay the peat down on the drying field. At the rate of 30 tons per day the cost per ton is about 86 cents. The cost of turning the peat is 7 cents per ton and the cost of placing it in stacks is 25 cents. It costs 20 cents per ton to place the peat in the storage shed and 25 cents to load it from there onto the freight cars. This makes a total cost of \$1.63 per ton for digging, spreading, handling and loading the peat for transportation. To this must be added the freight charges, the interest on the investment and the amortization. These items can not be estimated from the data at present to hand. It is believed, however, that they can not cause the cost of the peat to become so great as to eliminate it from competition with coal at \$7 or more per ton.

The Canadian Government will keep all of the peat that it requires for testing purposes and sell the rest at a suitable price.

The fuel testing station is located in Ottawa. It was erected during the summer of 1909. At present the plant is equipped for testing peat fuel only. The apparatus consists of a Körting double-zone suction gas producer, the necessary purifying apparatus, a Körting gas engine and a 50 kilowatt Westinghouse direct current generator. The producer room is large enough to hold additional apparatus and producers of other types are to be installed in the near future. These producers will be especially designed for bituminous coals and lignites. The producer is 15 feet high, 2 feet 9 inches wide and 5 feet long. The gas-cleansing apparatus is at the right of the producer. This consists of a wet tar separator and a coke scrubber.

The engine is a single-cylinder four-stroke-cycle machine, fitted with a throttling governor. The diameter of the cylinder is 15 inches and the stroke is 24 inches. The speed is 200 revolutions per minute. The air supply for the engine is obtained from the interior of the engine room through a brick duct built against the wall of the engine room. With this arrangement the temperature of the air supply remains practically constant throughout the year. During tests, the current generated by the dynamo is absorbed by either the bank

of 500 16-candlepower incandescent lamps which is located on the end wall of the engine room or by an iron grid against the wall.

When the producer is started up, suction is furnished by a small centrifugal exhaustor belted to an alternating current motor. The engine is started with compressed air.

The gas-testing apparatus is located on the right wall of the engine room. Gas is drawn from the system by a small Root blower and passed through a Junker gas meter. From the meter the gas goes to a calorimeter which is also a Junker instrument. The average effective heat value of the gas is about 126 B. t. u. per cubic foot. The producer requires from $2\frac{1}{2}$ to 3 pounds of peat per brake horse power per hour. The plant has been in actual operation for such a short time that no specific data in regard to the cost of operation and the performance of the apparatus are available.

PEAT IN THE CENTRAL PROVINCES OF CANADA.

Read at the First Meeting of the Canadian Peat Society by
L. B. Lincoln, Chicago, Ill.

Gentlemen:

Much has been said and more has been written on the subject of "Peat" and its destiny to fill a long felt want as the connecting link between the increasing fuel demand and the vanishing coal supply. The formation of peat has been under discussion for more than a century, but the discussion has been carried on mainly by European writers who considered conditions of a colder and moister climate and the development of their peat bogs is quite different from those here. According to Professor Früh, peat is composed of alternating colloidal substances of free humic acid and basic salts. The vegetable matter has undergone a process of carbonization, which is the first stage of its transformation into coal. Nature subjects these carbonizing vegetable matters under heavy rocks or earth strata, to enormous pressure and great heat, and—by extending this treatment throughout the ages—forms the coal we use, which we may term petrified peat vulcanized by sulphur and turned into a mineral condition. It has escaped my memory who is the author of the often quoted saying: "Peat is 200,000 years young coal"; this means that coal is really deteriorated peat. Thus peat possesses all the combustible elements of coal without its foreign and incombustible

materials, as silica and iron, and contains none of the deleterious sulphurous constituents nearly always found in hard and soft coals.

The subject interests us—the members of the Canadian Peat Society—only to the extent of the possibility of utilizing those vast areas of peat deposits which cover, as far as known, nearly 40,000 square miles of the country. The first step for the utilization of our peat beds has been made by the Government through its Department of Mines, and if the private industry will follow carefully along the path successfully trod we will arrive at the point where the predictions for the peat industry made by Doctor Haanel not long ago, will come true. He said: "Peat will be one of Canada's great industries." We might say without exaggeration: "Peat will be Canada's greatest industry"; and I am certain you agree with me that as there are several thousand miles of fuel consuming country, more or less populous, situated between the eastern and the western coal deposits, and as the wood supply is giving out, a new fuel must needs be found and employed, if we are not to become entirely dependent on supply from other countries or on the whim and mood of the big financiers, who some day may cut off our entire supply, while for anthracite we are already at the mercy of the coal barons and the striking operatives of Pennsylvania. Professor C. L. Norton, of the Massachusetts Institute of Technology, says:

"We have entered upon an era of high priced coal, and under present conditions the tendency of coal prices is steadily upward. For many large and populous inland districts, coal must always be relatively costly by reason of remoteness from production. This fact gives exceptional interest to whatever points to a source of fuel of much more general distribution than coal, materially cheaper, and exempt from long-distance transportation charges."

The well-known American authority, Doctor George Frederick Wright, describes the important function of coal as follows:

"Coal is the chief cornerstone of all modern civilization. Nearly all of the labor saving appliances must have coal to make them effective. Outside of the muscles of man and animals the chief source of power available for the use of man arises from the chemical combustion of coal. It is, therefore, rather startling to be compelled to face the fact that coal belongs to the limited and rapidly disappearing reserve forces of nature. In using coal the human race is trenching on its capital and recklessly hastening an ultimate and inevitable catastrophe."

The question is a very pertinent one, for even admitting that there will be coal in some places for many years to come, and perhaps generations, nothing is more certain than that the prices are advancing rapidly and will continue on an upward plane. This affects not only machinery, it affects every man, woman and child to such a degree as is true of no other commodity whatever, and the fuel question is therefore, the most vital question.

There is, however, a new fuel to be considered. This new fuel is peat. Not only is peat in demand as domestic fuel for cooking and producing heat, but also in metallurgical processes, in steel and glass furnaces, for firing boilers, generating electrical power, production of gas and for many other purposes. In short, peat is coming more and more into its own. One Canadian glass factory requested us to enter into a contract for 5,000 tons, and a Canadian paper factory for 2,700 tons peat fuel per year.

The presence of incombustibles accounts for the clinker, cinder, noxious fumes and preponderance of ash which trouble the coal user, and reduce a ton of coal to actually less than one-third of a ton of combustible material which can be made available for direct heat.

You can easily corroborate that by investigating your ash pile, where you will find from 13 to 30 per cent. of the total coal fed. A special test made of two tons of anthracite coal to ascertain the smallest possible loss, resulted in finding over five hundred pounds of ash and clinker, and although the smoke waste and unconsumed gases were not taken into consideration, the ashes proved also to contain about 25 per cent. of unconsumed coal sifted through a quarter-inch mesh. Those who are acquainted with and uninstructed in the use of coal for heating purposes and furnaces will often experience losses up to 65 per cent. of the total weight of fuel. In burning peat there is no waste whatever beyond a small percentage of fine ash.

Because of the endeavors of the Canadian Government the mining of peat and turning it into useful fuel has begun, and nothing can stop us now from becoming a very important factor in the peat industry of the world, unless we should allow ourselves again to be lured into enterprises based on Utopian promises to make good by either well meaning but little experienced peat men of this and other countries or by such who—in spite of their assertions—are less “well” meaning and still less “experienced,” but whose efficiency as promoters enables them the better to “do us good.”

One of our modern writers has said: “My mission in life

is to question, not to answer," and perhaps this epitomizes the thought of many would-be peat experts. They lay an unhesitating finger on the failures, and ask: "What are you going to do about it?"

Then there is another class of peat experts who offer for these unsuccessful experiments untried remedies evolved from theory. The world discusses the theories and picks flaws, opposing one plan with another; but for the most part these things remain in the realm of theory and that practical exemplification which alone proves the worth of ideas lags far behind.

Come to the peat world, however, not asking questions, but answering them, and not with a theory but with a practice.

I remember that at the last meeting of the American Peat Society, which was held in Ottawa during the summer months of last year, it was a matter repeatedly pointed out that we must discard all seemingly acceptable theories and stick—at least for the present and for years to come—to the so-called "wet-mud, air-dried machine peat process."

Before we can successfully operate a peat bog by any process, it is necessary that the deposit undergo a thorough examination. The Department of Mines assigns some of its employes to this work during a period of the year when the experimental peat plant is at a standstill. I assume with reasonable certainty that all of you are acquainted with the results, and it would be only a waste of time to relate what you can ascertain from the bulletins.

Doctor Haanel, to whom reporters have naturally looked as the representative and instigator of the peat research in this country, is reported to have said that next year (meaning 1911) he is going to make such tests in Manitoba to find out about the fuel value of large deposits reported in that province. Doctor Haanel, the Department of Mines and the Government can save themselves not only disappointment but the expenditure of a large amount of money by disregarding such unfounded statements which resulted in the loss of \$60,000 experienced by one Manitoba peat company, and \$50,000 by the other. What Doctor Haanel is intending to do "next year" I have already done "last year." The successful operation of the large, and so far as known, best peat deposit of the Province of Quebec situated near Farnham, last season, induced me to look for other peat deposits that might be utilized for peat fuel. For this purpose I looked especially to the central provinces, particularly to Manitoba. It would take too long to relate to you the hardships undergone during this prospecting trip of about nine weeks; notwithstanding the fact

that the encounters with wolves and lynx were highly interesting. But I can assure you that although I searched the country in every direction, from Winnipeg as central point, going north, northeast, straight east, southwest and west within a radius of one hundred miles and a little over, we did not find one deposit that would justify an investment for machinery, no matter how small, and the opening of a peat plant. The bogs appear at stages of growth and development from the incipient moss only a few inches in thickness to a rare depth of five feet, covering thousands of acres. The best quality, rarely found, was B—mostly B minus; it never rose to even B plus, and the average depth that we found everywhere was from two to three and a half feet; in some places we found islands five to six feet deep, but then the quality was, if possible, worse or the surrounding so wet that drainage canals miles long would have become necessary, and the cost of these would be exorbitant. We found the surface of the bogs mixed with ashes everywhere, due to forest fires and to the idea of farmers and settlers living in the vicinity, that peat bogs must be burned to be of any value. The ignorance of some people in regard to peat is simply amazing. We have been led fifteen and twenty miles out into the wilderness by professional men and surveying engineers, under the promise that we would find peat deposits thirty and forty feet deep, and when we got there we really found a depth of thirty and forty feet but no peat, just subterranean lakes or better, immense mudholes. The Transcontinental Railway promised us large and interesting results along their line. We examined twenty-one deposits thoroughly, have made over sixteen hundred test holes, and hardly to any avail. I can say that Manitoba is the poorest peat country that ever came under my observation in any part of the world. Under such conditions it is surprising that promoters have had the nerve to induce people to invest over \$60,000 in a single deposit, and to secure for them at great expense four sections of land, when in fact only eighty acres thereof are covered with peat of B minus quality, just barely fit for fuel, and even in this place, which has been reported to be the best peat deposit in Manitoba, we found peat only to a depth of five feet; I refer to the deposit of Lac du Bonnet. How could they ever fall for such a gold brick scheme! They were using the so-called Morrison-Kellond process, which cost the United States Peat Fuel Company of Chicago \$250,000 and which incidentally has contributed to the downfall and to bring into disrepute the peat industry in this and our neighboring country. If all the concerns that embarked in the peat business would learn from the

failures that were overcome by the European countries where the peat industry today is a factor of enormous influence, and if they would not think themselves more experienced "wise-men" than the people on the other side of the ocean who have spent millions of dollars and numberless years to solve this problem, they would have saved all the millions wasted and would have served their country far better. But it is not too late yet. Let none of us go hastily into the purchase of any peat bog that has not been thoroughly examined as to its contents and possibilities, and let none of us purchase machinery, no matter how splendidly advertised and recommended by technical periodicals, until we have thoroughly tested that machinery, and not until it is proved to our fullest satisfaction that it is the proper machinery for this country. I must incidentally refer to articles that have appeared in the press lately advertising machines of the old country under the cover of technical information. You cannot compare; the labor conditions here are entirely different, the cost of production entirely different from those that prevail across the water, and above all, the peat deposits here are not what they are over there.

To return to our muttons: I wish to say that after strict search and due inquiries, and having found the peat deposits of Manitoba wanting in every respect, I have selected the Lac du Bonnet plant as the only one that might—mark well, I said **might**, not **will**—pay expenses, not more; and I would have chosen not even that deposit if I had not found on the spot a very well kept factory building and several log cabins and other housing facilities for the working crew; but as they were there, and as there is a loading siding and track scales, all of which I have been able to obtain on a long lease, I saw no reason why I should not at least attempt to make the best of these bad enough conditions.

PEAT PRODUCTION IN THE UNITED STATES IN 1909.

Charles A. Davis.

(From Mineral Resources of the United States for the Year 1909.)

The preparation and use of peat as fuel has been almost entirely neglected in the United States, in spite of the widespread occurrence and generally good quality of peat beds in those parts of the country where no workable coal deposits occur, and the demand for fuel is large, for power and heating

purposes. In New England and some other older sections of the country, it is true that, to some extent, peat was cut from the swamps and used in many localities for domestic fuel until the coal trade developed, when even this small use was generally abandoned.

Since 1903, however, there has been a considerable and persistent interest in the economic possibilities of the great peat deposits known to exist in many parts of the country, and numerous attempts, some of which have involved the expenditure of large sums of money, have been made to place peat fuel on the markets of the country in commercial quantities.

The more notable and extensive peat fuel plants have been those adopting the plan of briquetting powdered dry peat, generally without the use of a binder. None of these plants have remained long in operation or produced fuel in commercial quantities; from these facts it has been assumed that the briquetting process was not adapted to peat. With equal, or more, justice, however, the apparent lack of success of the enterprises mentioned might be attributed to the use of inefficient driers, or methods of drying; to the inexperience of the operators; to the use of poorly devised briquetting presses and other equipment; to lack of capital to continue what were announced to be experiments only; to lack of transportation facilities; or to other similar factors, any one of which might be just as important as that to which the lack of success was charged.

Less conspicuous, because less widely advertised, and less spectacular, have been the small factories started to make "machine," "condensed," or "wet process" peat fuel. In any modification of this method, the peat is taken wet as it comes from the bog, which may be drained or not, and ground into a pulp in a simple grinding machine, similar to a brick-maker's pugmill. Such machines break up the woody matter and other coarse remains of plants contained in the peat and form the resulting peat pulp into long, prismatic strands which are cut into bricks as they issue from the outlet under comparatively slight pressure; the bricks are received on boards, or pallets, on which they are spread out to dry by exposure to the air, being turned as often as necessary while drying. A modification of the process in use in Europe, eliminates the bricking operation, the pulp being dropped from the machine into tram cars and conveyed to a previously leveled part of the bog, where it is spread out into a thin sheet and marked off into rectangular blocks by a special machine; after several days the blocks become separated; they are then turned over, and

later, after they are partly dried and hardened, they are stacked.

Plants for making machine peat require a much smaller investment of capital for the same output than the more complicated briquet factories, and the thoroughly air-dry bricks or blocks of machine peat make as good fuel, for the same tonnage, as the more finely finished briquets.

This method of manufacture is in general use in the peat-producing parts of Europe, where more than twelve millions of tons of good fuel are made annually by various modifications of the method.

The enterprises started in the United States for using this process have not generally been very productive and several have run for a short season only, after which they have been abandoned; in every such case, however, enquiry has developed the fact that the work was never on an efficient basis, so far as production was concerned, so that not for a single sustained period, often not for one day, did the equipment reach its estimated output.

Restating the matter in a somewhat different way, the failure to produce peat fuel in the United States, on a commercial basis, has been due to other causes than those found in the peat itself, of which over enthusiasm, lack of understanding of the factors involved in reaching the stage of successful commercial production, too little capital, and too much confidence in poorly designed and untried machinery are important. The question of market apparently has never entered into the matter since the small amount of the products offered by the plants mentioned have always sold readily at good prices.

It seems true, in some cases, that errors in management have been responsible for the lack of success in the production of peat fuel. Instances have not been rare where men without actual working knowledge of handling peat, or of machinery for preparing it, have been put in charge of mechanical equipment designed and built as the result of long European experience, and, at the outset, have assumed that this was all wrong, because it could not be made to do what was expected of it with an inexperienced working force, and without farther trial, have condemned it, or discarded it for types of their own invention.

Production of Peat Fuel in 1909.

During the year 1909 there were only a few small peat fuel plants in operation in the United States, and most, if not all, of these were still in experimental stages of development throughout the entire season. They were as follows:

The Lexington Peat Co., East Lexington, Mass., a small briquetting plant with production for experimental purposes only. The Saugus Peat Co., Lynnfields, Mass., making a very small output of cut peat. The Massachusetts Peat Fuel Co., Norwood, Mass., producing machine peat, started very late in the season on account of changes in machinery. No commercial production in 1909.

There were two small peat fuel factories in Maine; one operated by F. H. Fellows at Lewiston with a small commercial output of machine peat; the other was maintained by the Peat Manufacturing Company of Bangor, at Bucksport, for the purpose of testing an improved method of removing water from peat to hasten the drying for fuel. The fuel made in 1909 was consumed at the plant.

The American Peat Coal Co. operated its plant at Pompton Plains, N. J., for a part of the season, making machine peat with a German peat machine. The output, which was small, was sold on contract for a special purpose.

At Bancroft, Michigan, Mr. P. Heseltine, of Detroit, operated a newly invented machine for macerating peat, and produced the largest amount of peat fuel reported by anyone for the year, although the plant was still in an experimental stage of development. A good quality of machine peat was made.

The only other peat fuel plant that reported any production for 1909 was that of the Fertile Peat and Brick Company at Fertile, Iowa. This company manufactured machine peat and used part of its output for firing brick kilns and the rest was sold at a fair price.

The total production of peat fuel reported was 1,300 short tons valued at \$4,680, an average of \$3.60 per ton. The highest price reported was \$5.00 per ton.

Production of Peat Fertilizers and Fertilizer Fillers for 1909.

There were 11 producers of peat for fertilizer uses reported in operation during the year. These were distributed over the country as follows: Florida 1, New Jersey 2, New York 2, Pennsylvania 1, Ohio 1, Indiana 2, Michigan 1 and Illinois 1. Two of these with small production in 1908 did not report for 1909, but it was learned that they were not closed.

The total production from the factories reporting their output for the year was: Short tons, 26,768; value, \$119,891; average price per ton, \$4.48.

This was nearly 4,000 tons more than reported in 1908, but the average price per ton is 79 cents per ton less. This lower average price is doubtless due to the fact that at some

of the plants considerable sun-dried material was sold at prices below the selling price of the "bone-dry" or artificially dried powder. It was generally stated by the producers that the prices received were too low to be satisfactory.

Production of Peat Moss Stable Litter.

A single firm, the John E. Baker Moss Co., of Garret, Ind., made this product in 1909, in the United States. As in former years the litter was sold in bales weighing about 225 pounds each, and the quantity made is reported as 1,254 short tons, or 11,000 bales. The price received was not quoted, but in 1908 it was \$1.25 per bale, at the plant, for less than carload lots, with a small reduction on large lots; at this price the value of the year's output would be between \$12,000 and \$14,000.

Imports of Peat Moss Stable Litter.

For many years past there has been an annual importation of peat litter into the large coastal cities of the United States, the largest importations being at the port of New York, Philadelphia taking the second place. This material comes chiefly from Holland, and is brought into the country in burlap-covered bales. The peat from which it is made is evidently dug from the upper, poorly-decomposed layers of beds of sphagnum and sedge peat, such as are of frequent occurrence in the northern part of the United States, especially in the New England States, but also in New York, Michigan, Indiana, Wisconsin and Minnesota.

As bedding for horses and stock this peat litter has many desirable properties, and should be more widely produced and used than it is in this country.

There were imported into the country for consumption in 1909, from Europe, 8,400 long tons (or 9,408 short tons) peat moss litter; value, \$47,227.

Peat Production for Other Uses.

Peat is used to a small extent in the manufacture of refrigerating plants as an absorbent in small admixture with mineral wool, and also as an ingredient of certain kinds of stock foods, especially those containing beet sugar molasses and other sugary wastes. In Europe its use in stock foods has become extensive and has been approved by the veterinarians of agricultural experiment stations and of some of the armies, after careful tests. Peat of the right sort makes an excellent absorbent for the molasses, rendering it easy to feed, and it also prevents fermentation.

No reports have been obtained of the amount of peat used for these purposes.

Summary.

The total production and consumption of peat for all purposes for 1909 was, so far as reported, therefore:

Use	Short Tons	Value
Fuel.	1,300	\$ 4,680
Fertilizer Purposes	26,768	119,891
Stable Litter, produced.	1,254	13,000
Stable Litter, imported.	9,408	47,227
	<hr/> 38,730	<hr/> \$184,798

EUROPEAN NOTES.

L. B. Lincoln.

The Royal German Bog Commission last season constructed and thoroughly tried a small gasoline locomotive for transporting the large amount of peat fuel required for the central electric power station, from the drying grounds to the storage piles. This locomotive runs on a portable and easily changed track upon the very soft peat bog. The engine develops 8 horse power at 350 revolutions per minute and can draw 10 cars completely loaded with peat weighing about 20 tons, at a speed of about 5 miles per hour, and returns with the empty cars at a rate of 10 miles. The weight of the locomotive is about 6,500 pounds and its performance was so satisfactory that a similar locomotive of larger capacity has now been installed.

Peat Production in Sweden in 1908. According to the report of the United Commercial Association for 1908, the latest complete report that has been received, the value of peat products in Sweden in that year was about 2,000,000 kroner (\$540,000). Following is a list of the districts where peat is produced, the number of factories and the value of the production in each district:

District	Number of Factories	Value of Output
Kristianstad.	8	\$37,170
Malmöhus.	6	19,882
Sudermanland.	3	13,273
Kroneberg.	4	11,106
Upsala.	2	5,904

Oestergötland.	3	5,292
Göteborg and Bohus	1	2,430
Aelfsborg.	1	2,160
Jönköping.	1	1,288

In addition to the fuel produced from the bogs there was a large production of peat litter and peat mull, or powder, as the table below shows. Peat litter finds an increasing market wherever it is used:

District	Number of Factories	Value of Output
Kristianstad.	15	\$106,380
Oerebro.	15	73,472
Jönköping.	12	52,026
Skaraborg.	10	41,914
Kronoberg.	7	25,326
Malmöhus.	5	24,944
Värmland.	10	20,016
Aelfsborg.	5	10,611
Kalmar.	4	9,913
Oestergötland	4	9,200
Kopparberg	6	8,176
Västmanland.	3	7,695
Halland	2	7,236
Södermanland	2	4,839
Blekinge	1	3,863
Stockholm	1	1,984
Göteborg and Bohus	1	735

Peat Buildings. A mill owner in Eastern Prussia has been experimenting for many years with peat as building material and has recently succeeded in erecting fireproof buildings from peat and concrete. The supervising director of buildings of Eastern Prussia reports as follows in regard to such a house, the processes employed, for which patents have been applied for; the report also includes an account of an experimental fire set in such a house. The supporting structural parts, such as pillars, corners, etc., are made of solid concrete, and the applicant for patents uses peat bricks, specially formed and dried according to his system for the purpose of filling in the walls which are about a foot thick. In districts where ordinary bricks are not easily obtainable, the new building process has aroused a large interest, as the sand necessary for making concrete can be found everywhere and as cement is also easily obtainable. The bricks are joined tightly, set into mortar, by a very strong concrete mixture, the formula for which is a secret. The low weight of the peat bricks, only about one-twentieth

that of common bricks, makes it possible to have large quantities transported by the railways at very low cost. He further states that the foundations and also the chimney boxes are stamped out of cement concrete. The outer concrete mortar finish dries very quickly on peat brick walls and as there is no opportunity for water or moisture to settle, buildings made in this way can be occupied as soon as finished. There is a saving of twenty to twenty-five per cent in the total building cost in comparison with that of common brick.

The buildings that were built by this method last year have proved quite successful during the four seasons, and many well-known building experts have visited them and have expressed the opinion that the peat houses have shown many advantages and so far no disadvantages in the construction have been found, and they recommend it, especially for the building of houses for laborers.

One point, however, remained in doubt, namely as to whether the buildings were fire proof. It was thought that the outside coat of concrete might fall off, especially in case of fire, when water was spread upon the hot surfaces; for this reason fire insurance companies charged extremely high rates for the insurance of such buildings.

In order to show the degree to which these buildings were fire proof, the inventor erected a number of one family houses for workmen, including a stable and barn about fifteen feet long by fifteen feet wide and ten feet high, and in the presence of the representatives of many fire insurance companies, and numerous invited representatives of the state and provincial government, he set fire to these buildings, with the assistance of the fire chief of his town. The results were as follows:

(1) The walls did not show any increase in temperature on the outside.

(2) There were only a few extremely small cracks noticeable.

(3) The concrete finish of the surface on the inside of the building remained intact, in spite of very frequent wetting from the fire hose.

(4) Where the walls were broken into purposely the passing flames caused only a very slight glowing of the peat fibers, and the cement filling between each two bricks proved to be complete protection against the spreading of the fire.

(5) There was absolutely no change in the concrete corners and pillars, and the walls could not be moved from the upright position until great force was applied. At the rebuild-

ing, the walls were used again after a very little repairing.

The special points were also made that the capacity of the peat as a disinfectant and as an insulator made the houses conducive to the health and comfort of the tenants by giving an agreeable and healthy temperature to the rooms. It was also noted that the considerable saving on building material and cost of construction was a prominent advantage of these houses.

THE CARE AND USE OF EXPLOSIVES.

By J. L. Cochrane.

The following synopsis of Miners' Circular No. 1, Bureau of Mines, is published here for those who may be called on to use explosives in clearing land of stumps and roots of trees or other obstructions.

Washington, D. C., February, 1911.—Miners' Circular No. 1, the first of a series to be written in plain, non-technical language for the benefit of the miner, has just been issued by the Federal Bureau of Mines. It contains the names of the permissible explosives tested by the bureau at its Pittsburg station up to November 15, 1910, and gives precautions as to their use. Permissible explosives give a short and relatively cool flame that is less likely to ignite inflammable gas or coal dust than is the longer and hotter flame of dynamite or the longer and much more lasting flame of black powder. Because they can be used with greater safety, permissible explosives have taken the place of other explosives in many coal mines in the United States during the last two years and their use is increasing rapidly.

To reduce the risks in storing, thawing, and handling explosives at coal mines, the following precautions are urged by the Bureau of Mines::

Don't store detonators with explosives.

Don't open packages of explosives in a magazine.

Don't open packages of explosives with a nail puller, pick or chisel.

Don't store explosives in a hot or damp place.

Don't store explosives containing nitroglycerin so that the cartridges stand on end.

Don't repair a magazine until all explosives are removed from it.

Don't use permissible explosives or other explosives that are frozen or partly frozen.

Don't thaw frozen explosives before an open fire, in a stove, near a boiler, near steam pipes, or by placing cartridges

in hot water.

Don't put hot water or steam pipes in a magazine for thawing purposes.

Don't carry detonators and explosives in the same package.

Don't handle detonators or explosives near an open flame.

Don't expose detonators or explosives to the sun for any length of time.

Don't open a package of explosives until ready to use the explosive, then use it promptly.

Don't handle explosives carelessly.

Don't use more than $1\frac{1}{2}$ pounds of any permissible explosive for one shot in a coal mine.

Don't use a detonator (blasting cap) or electric detonator of less strength than No. 6.

Don't crimp a detonator (blasting cap) around a fuse with the teeth.

Don't economize by using a short length of fuse.

Don't use in a gaseous coal mine any fuse or other device which emits flame or sparks.

Don't use coal cuttings or "slack" or any combustible material for stemming.

Don't use a metal tamping rod. A copper tipped rod is not to be recommended. Wooden rods are safer.

Don't use two kinds of explosives in the same drill hole.

Don't return to the face until at least 5 minutes after a shot has been fired.

Don't breathe the gases from the shot.

Don't return to the face after a misfire for at least one half hour.

Don't attempt to draw the charge in case of a misfire.

Don't leave any detonators or explosives in a mine over night.

Don't charge or load any hole which has not been properly placed or has been drilled "on the solid."

Don't light the fuse of dependent shots at the same time the first shot is lighted.

Don't expect to get satisfactory results with a permissible explosive or any explosive when a miner uses it for the first time.

Don't think the use of permissible explosives can take the place of other safety precautions in mines and thus neglect those precautions.

The Miners' Circular may be obtained by anyone inter-

ested by applying to the Director of the Bureau of Mines, Washington, D. C.

ON THE MANUFACTURE OF PEAT AND PEAT POWDER BY EKELEND'S METHOD.

A Report to the Swedish Government by Captain Ernst Wallgren, Chief Peat Engineer.

(Translated by G. E. Boberg, Alameda, Cal.)

During the last four years, as opportunity has offered, I have been investigating the method invented by Lieutenant H. Ekelund for manufacturing peat powder and the raw material from which it is produced; during the last two years I have visited the factory at Bäck when it was running and this year (1910) made some tests to obtain the costs of production at both the peat powder factory and at the combined digging and pulping machine.

The estimates here presented have been made from analyses of average samples taken during the tests, from the sample record book, from information gained from other sources and from my own tests, the records of which are in my office. I herewith publish the following opinion:

With the introduction of the machinery constructed by Lieutenant Ekelund for treating and further preparing the raw peat and also for the production of peat powder, I believe that very important improvements have been made over former attempts to give larger production of peat fuel, with less labor, both in making the raw material (air dried machined peat) averaging 40 per cent. water, and the peat powder with an average of 15 per cent. water.

The peat powder is an excellent fuel for steam boilers, etc., etc., and the total cost of production is comparatively low. The conditions of Bäckmossen are such, that with a normal production of 10,000 metric tons a year, from two drying furnaces, the cost per metric ton (2204 lbs.) of powder will certainly not exceed 8.50 kroner (\$2.30) per metric ton of powder, including all costs of labor, supervision, management, insurance, taxes, fuel, interest on investment at 5 per cent., amortization and depreciation, etc., etc.); of this cost, 3 kroner (\$.81) at the most is for the raw material, machine peat with 40 per cent. water. It is probable that the cost of production will be less than 8 kroner (\$2.16) per metric ton, when alterations already planned have been made in the methods of transporting the peat at the drying grounds, at the driers, etc., and especially when the production is at larger plants with four to six driers. Because of these facts, it is my opinion that mineral coal cannot compete with our

native peat fuel for use under steam boilers as soon as the manufacture of peat powder begins to be general and devices for the efficient firing of peat powder are introduced.

What this means for our peat industry, for the national welfare and development, and for our independence of foreign countries can be easily understood.

Lieutenant Ekelund's grand work places our native country under obligations to him. We no longer stand before a tested, theoretical possibility, but by the demonstration of Ekelund's method at the Bäck factory, we have actual results, proved by practice, obtained in manufacturing a finished peat product, which, as a valuable fuel for steam boilers, is cheaper than mineral coal. This is equally true, if through some local or other condition, the cost of production should amount to a few kroner more per ton than is stated above.

(Signed) ERNST WALLGREN,
The Government's Chief Peat Engineer.

Skara, Nov. 12, 1910.

Investment Calculations for a Production at the Back Factory of 10,000 Metric Tons of Peat Powder per Year.

The basis of the calculations: According to my own observations, which closely correspond with the information obtained from foremen and employees, the "Munktell's" combined digging, macerating and spreading machine works up, on the average, 35 to 40 cubic meters (45.7 to 52.3 cubic yards) of peat from the bog, which is equal to 6.5 metric tons (7.1 short tons) of peat with 40 per cent. water; this is equivalent to 130 metric tons (143 short tons) which can be produced during two working shifts of ten hours each. With the same kind of a machine on the northern part of the bog, where the abandoned "Svedala" digger had been working, and where the peat is of lighter material, and where there are more stumps, to be on the safe side I would estimate the yield per 24 hours to be not more than 115 metric tons (126.7 short tons).

Two "Munktell's" digging and peat pulping machines of the present type of construction and under the conditions at Bäck, in 75 working days would produce 130x115x75, or about 18,400 metric tons (20,275 short tons) of peat with 40 per cent. of water, which, according to the following calculation is needed for making the estimated quantity of peat powder.

When working the raw materials with an average of 40 per cent. of water, the machines could be worked at least a month longer than the time mentioned, three months, with 75 working days, and, perhaps, the greater part of the peat work-

ed during this time may be collected with less than 40 per cent. of water. If only one digging machine should be used on the best part of the bog, the yield for 100 days' work would only amount to 13,000 metric tons (14,326 short tons) of peat with 40 per cent. moisture, which is too far short of the necessary 18,400 metric tons. To be on the safe side, therefore, it is necessary to have two digging machines of the present construction on the bog.

The amount of raw peat required. According to the estimates and the actual scaling of the amount of peat produced during the investigation of the peat powder factory (Sept. 5-8), the amount required to make up the estimated 10,000 metric tons (11,020 short tons) of peat powder for the market, and 800 metric tons (882 short tons) for fuel, the peat materials are in the following proportions:

	40 Per Cent. Water.	15 Per Cent. Water.	Dry Solution.
The material required <i>for market</i> ..	14,170 metric tons 15,615 short tons	10,000 metric tons 11,200 short tons	8,500 metric tons 9,367 short tons
Amount in separated and sieved fibers	600 metric tons 661 short tons	420 metric tons 463 short tons	360 metric tons 397 short tons
	660 metric tons 727 short tons	470 metric tons 518 short tons	400 metric tons 441 short tons
Amount lost by burning, etc., and by shrinkage in the driers.....	15,430 metric tons 17,000 short tons	10,800 metric tons 12,000 short tons	9,260 metric tons 10,205 short tons
	1,130 metric tons 1,245 short tons	800 metric tons 882 short tons	680 metric tons 749 short tons
	50 metric tons 55 short tons	35 metric tons 39 short tons	30 metric tons 33 short tons
The materials <i>for fuel</i>	50 metric tons 55 short tons	35 metric tons 39 short tons	30 metric tons 33 short tons
Amount in sifted fibers	1,230 metric tons	870 metric tons	740 metric tons
Lost in drying	1,355 short tons	960 short tons	815 short tons

When manufacturing the peat powder the fibers are sifted out, consequently there are 390 metric tons (430 short tons), dry weight, of material suitable for sale as "peat litter." This could be sold with 25 per cent. moisture, in which case it would amount to 500 metric tons (551 short tons) of litter.

Raw peat estimated for the suction gas-producer (of corresponding power generator). It is calculated that 1.3 kilograms (2.9 lbs.) of peat containing 30 per cent. of moisture and corresponding to 1.5 kilograms (3.3 lbs.) with 40 per cent. moisture, will furnish an effective horse power per hour.

For the two peat machines, each requiring 75 horse power, there will be needed 340 metric tons (375 short tons) (150 h. p. x 20 hrs. x 75 days x 1.5 kilograms) of peat containing 40 per cent. of moisture.

For the Powder Factory. The average production per day for a drying oven during the tests made was about 20.5 metric tons (22.6 short tons), of which 1.5 metric tons (1.65

short tons) was required for fuel. The two furnaces therefore yielded 38 metric tons (42 short tons) of peat powder, besides the amount used for fuel, or 10,000 metric tons would be produced in 263 days. Because one drier required the equivalent of 80 horse power, I have calculated for two, 150 horse power; the fuel required for these would be 1,400 metric tons (1,542 short tons) (150 h. p. x 24 hours x 263 days x 1.5 kilogrammes) of peat with 40 per cent. water. At the tests, September 5th to 8th, the suction gas producers consumed 8.4 metric tons (9.25 short tons) of peat, with a moisture content calculated at 30 per cent., to produce 67 metric tons (74 short tons) of powder, which makes 1,200 metric tons (1,322 short tons) for 10,000 metric tons of powder, or 1,400 metric tons (1,543 short tons) with 40 per cent. moisture.

	Metric tons	Short tons
Resumé. For fuel to generate power for the raw peat machinery, in the gas producers..	340=	375
For fuel for running the driers.....	1,400=	1,543
For fuel for the furnaces.....	1,230=	1,355
For peat powder for the market.....	15,430=	17,000
Total peat with 40 per cent. water.....	18,400=	20,273

The cost of labor, (piece work). At Bäckmossen when I was testing the production of the raw peat the standard contract price per metric ton of peat at the "Munktell's" machine was 67 ore (18.09 cents) per metric ton with 40 per cent. water for the peat formed and spread out on the ground. The prices paid for turning were 12.5 to 13 ore (3.37 to 3.51 cents); for piling into heaps, 25 ore (6.75 cents); for hauling to the factory, (here is added the losses of peat when it is collected and loaded, etc., a high estimate), 45 to 50 ore (12.5 to 13.5 cents) per ton estimated with 40 per cent. water.

I must consequently estimate the average cost for work and transportation to the factory (conservatively) at 1.55 kroner (41.35 cents) per ton of peat with 40 per cent. water. The wages for the day's work of the engineers at the suction gas producers ought to be divided between the costs of the raw peat and the peat powder production, assuming 300 working days per year.

During 37 days the raw peat factory is running alone.

During 38 days both raw peat and peat powder factories are running together.

During 225 days the peat powder factory is running alone.

Total 300 days per year, each day with two shifts of lab-

orers. The raw peat factory therefore is running 75 days and the powder plant 263 days.

The time of the engineers is to be apportioned as follows:
 For the raw peat factory..... $(2 \times 37) + 38 = 112$ days' work
 For the peat powder factory..... $38 + (2 \times 225) = 488$ days' work

Total 600 days' work

The raw peat factory. Cost of plant.

	Kroner	Dollars
The bog, drained and leveled.....	45,000	12,150
Two complete digging and peat machines....	50,000	13,500
Peat transfer materials	25,000	6,750
	Kroner	Dollars
Peat storage sheds	25,000	6,750
Part of power plant	20,000	5,400
Total	165,000	44,550

Cost of production (high estimate)

Interest, 5 per cent. on 165,000 kroner, the cost of plant, and on 15,000 kroner, working capital	9,000	2,430.00
Amortization and repairs, 7% on 165,000 kroner	11,000	2,970.00
Administration and salary 2,000, insurance 1,000, taxes 500	3,500	945.00
Wages to foreman (150 days at kr. 4) 600 kroner; engineer (112 days at kr. 4) 450 kroner.	1,050	283.50
Direct costs for work and transportation of 18,400 tons of peat at 1.55 kroner per ton.	28,500	7,700.00
Fuel for the gas producer, (340 tons at 3 kroner), 1,020 kroner; gasoline for two locomotives for transporting peat, 280 kr., oil 500 kroner	1,800	486.00

Total cost of production of 18,400 tons raw peat 55,400 14,960.00

Or, at the highest, 3 kroner (81 cents) per metric ton of peat, with 40 per cent. water or 5 kroner (\$1.35) per metric ton of dry substance in the raw peat.

The peat powder factory. Cost of plant.

	Kroner	Dollars
Factory building, etc., etc.	25,000	6,750
Two driers with fixtures	50,000	13,500

Part of power plant	30,000	8,100
Total	105,000	28,350

Cost of production. (High estimate.)

	Kroner	Dollars
Interest, 5 per cent. on 105,000 kroner, the cost of plant and on 10,000 kroner working capital	5,750	1,550
Amortization and repairs, 7 per cent. on 105,000 kr.	7,350	1,985
Administration and salary 2,000 kroner, insurance 1,000 kroner, taxes 500 kroner....	3,500	945
Foreman (263 days at 4 kroner) 1,050; engineer (488 days at 4 kroner) 1,950.....	3,000	810
Labor (14 men in 2 shifts for 263 days), 3,682 days at 3 kroner	11,050	2,984
Wear and tear of sacks, oil, etc., (50 ore per ton powder)	5,000	1,350
Peat fuel, 1,400 tons to suction gas producer; 1,230 tons to powder as fuel for the driers and 15,430 tons to powder for the market; 18,060 tons with 40 per cent. water at 3 kroner	54,180	14,630
Allowance for differences	170	46
	90,000	24,280
To be subtracted the value of 500 metric tons of fiber sold as litter at 10 kroner per ton...	5,000	1,350
	85,000	22,950

Or at the most, 8.5 kroner (\$2.30) per metric ton of peat powder with 15 per cent. of water, or 10 kroner (\$2.70) per metric ton of dry substance in the powder.

The reduction of the cost of production. By the alteration of the hopper of the peat machine so that woody remains could be removed without any loss of time and after applying electric power for the transportation of the peat on the bog; and because during some years a certain amount of peat ought to be collected with less than 40 per cent. of water; and most probably more than 18,400 metric tons per season could be produced with two digging machines, the cost of production must be reduced considerably under 5 kroner (\$1.35) per metric ton of dry substance in the peat, consequently also, considerably under 3 kroner (81 cents) per metric ton of raw peat with 40 per cent. water.

Because of these facts and by some minor alterations in

the driers, in consequence of experience gained since those in use were constructed, the cost of the production of the peat powder ought to be reduced considerably under 10 kroner (\$2.70) per metric ton of dry substance in the powder; probably below 8 kroner per metric ton with 15 per cent. water, and much below with a large production from 4 to 6 drying furnaces.

APPROXIMATE ESTIMATE FOR A PEAT LITTER AND MULL FACTORY.

Capacity 400 bales per day of 20 hours.

The following estimate is on German machinery and may prove of interest to some of the readers of the Journal, because peat litter may be considered the most profitable way in which to utilize suitable peat that has yet been found.

Output.

320 bales Litter each of 300 lbs.....	48 tons
80 bales Mull each of 400 lbs.....	16 tons
Total	64 tons

Plant.

1. Machinery and storage building 100x50.....	\$ 2,000
2. Power plant (producer, gas engine and dynamo 100 H. P.)	10,000
3. 2 Presses, 1 Reisswolf, elevator, revolving sieve, transmission, beltings	4,000
4. Excavator and other machinery for digging and drying of peat	4,000
5. Lidgerwood cableway	2,000
6. Tools and sundries	3,000

\$25,000

Working capital 15,000

\$40,000

Raw Material.

300 work days at 64 tons, 19,200 tons at \$1.50.....\$28,800

Daily Expense—Factory.

1 Machinist	\$ 3.00
11 Laborers at \$2.00.....	22.00
Fuel	10.00
Wire and material for bales.....	25.00
Night shift	25.00

\$85.00

Which is about \$1.32 per ton.

General Expense.

Depreciation on buildings and machinery, 10%.....	\$2,000
Salary for manager	2,000
Selling expense	5,000
Repairs	1,000
Total	<u>\$10,000</u>

Income.

14,400 tons Litter at \$8.00.....	\$115,200
4,800 tons Mull at \$10.00.....	48,000
Total	<u>\$163,200</u>

Expenses.

Raw material	\$28,800
Productive labor and expense 300 days at \$85.00....	25,500
General expense	10,000
	<u>\$64,300</u>
Net profit	\$98,900
Or on a capital of \$250,000, 39½%.	

TO WHOM DOES THE CREDIT BELONG?

(From "The Chemical Trade Journal," Jan. 21, 1911.)

To those who like to study controversies concerning the distribution of credit for important technical discoveries, we recommend the correspondence in two recent numbers of the Chemiker Zeitung (No. 149 of 1910 and No. 1 of this year), from Mr. Lymn on the one hand, and Dr. Caro on the other, in which very different views are expressed as to who should be credited with having made practicable the gasification of peat in producers with ammonia recovery. Mr. Lymn's letter was called forth by Caro's paper read to the Deutscher Naturforscher und Aerzte at Königsberg, in which, according to Lymn, he claimed the credit for himself. Lymn proceeds to state that the idea of gasifying air-dried peat in a Mond producer springs from Mond, and Mond alone, he having made experiments with a large scale recovery plant at Winnington so long ago as June, 1905. Still earlier (in July, 1904), experiments were made in the works of the Power Gas Corporation, at Stockton, using so-called wet peat, with 40 per cent. moisture. These experiments, which led to the production of large quantities of power gas and of ammonia, sufficed, according to Lymn, to determine the conditions requisite for the economic application of the process on the large scale. With these experiments Caro had nothing to do, and when a year later (autumn, 1905)

he became associated with Mond and the Power Gas Corporation in initiating a certain undertaking in Germany, peat was not in question, the producers being supplied for the utilization of culm. Lymn proceeds to explain that until recently he was the technical manager of the Power Gas Corporation, and that it was he who actually worked out the process of treating peat—a process he carried to the stage of technical success. As proof of this, he cites the fact that in 1906 many tons of Italian peat were gasified at Stockton, that the works' engines were run on the gas, and as a result the order was given for a large plant for erection in the neighborhood of the Italian moor whence the peat came. This has been working successfully now for more than a year. Last spring another installation—this time in England—was arranged for. Now the process, according to Lymn, is neither his discovery nor Caro's, nor is it new. It rests on the researches of Mond, and all Lymn claims is the technical working out of its application to peat. As for Caro's mysterious references to a fusion of the drying and distillation processes, these are nothing but the well-known Mond processes of producing gas, with ammonia recovery, and it is this process which Caro seeks to cover in two German patents, one of December, 1906, the other of January, 1909. So says Lymn, who for his part has always held the view that there was nothing patentable in the application of the process to peat. Lymn says credit is due to Caro for recognizing the applicability of the process to the revaluation of the great peat deposits of Germany and for recommending it so zealously. To Caro's advice, also, is due the formation of a company, some four years ago, to work the process in Germany in the light of our English experience. This company erected a plant in Sodingen, which has for some time worked under the supervision of Lymn or his subordinate, using wet peat. The extremely favorable results yielded by this installation have been repeatedly described by Caro. With the rest of Caro's dissertation, Lymn finds himself in complete agreement, that is to say, he shares Caro's estimate of the future importance of the process and the probability that it will remove the centers of some industries from the regions of cheap water power to those where peat abounds. Finally, he repeats that the process is neither his nor Caro's, but Mond's, and that the working out of its application to peat is due to himself as representing the Power Gas Corporation.

Then Caro: Since 1897, says he, has his partner, Dr. Frank, been closely concerned with the utilization of peat for power (especially electric power) purposes.

The most important result of his early work was the establishment of the fact that for the industrial utilization of peat a gas making process must be found which would deal with peat containing as much as 50-60 per cent. of water, as practically and economically, only such peat comes in question as raw material for the gas producer. Caro had, since 1904, concerned himself closely with the recovery of ammonia from low-priced organic materials—notably the residues from coal washing operations, and it was at his suggestion that experiments were made with this material at Stockton in 1905, and that a Mond plant was later installed at Sodingen. Then, only, in 1905, was the Power Gas Corporation put in possession of the results of Frank's researches on peat, in order that they might make experiments with this material in Stockton. The Sodingen plant, designed according to Lymn by him, was erected in 1907, and, according to Caro, it needed modification in nearly every part before it could be pronounced successful even on the slack ordinarily used in Mond producers, or on the coal residues for which it was designed. Lymn and his associates are alleged to have been tied to the job for more than a year trying to get the plant to fulfill the guarantees of the makers, and this was only accomplished after a series of alterations and additions, suggested by Caro or by Dr. Hamers, the manager of the Sodingen Company, styled the Deutsche Mondgas Gesellschaft. When the plant was finally got into running order in May, 1908, experiments were begun with peat. These showed that the plant was well enough adapted to gasify air-dried peat, but that attempts to substitute wet peat led to poor gas and inefficient ammonia recovery. Frank and Caro then set to work to discover what modification of the process was necessary to make it applicable to wet peat, and in effect they found the solution of the problem to lie in the use of superheated steam and air, superheated in a special superheater, and in bringing about an initial hydrolysis of the peat substance in a zone well above that in which, in the Mond process, any action other than elimination of moisture takes place.

This approximating and overlapping of the drying and reaction zones, contrary to Lymn's statement, is no part of the Mond process, in which on the contrary these zones are distinct and separate. Nor did the Power Gas Corporation know the influence on wet peat of causing a fusion of these zones, until after Caro's work, as is shown by that fact that the plant which they offered for the purpose before that date included special means for partial drying of the peat in the upper part of the producer. Whether the Power Gas Corporation experimented

in 1905 with air-dried peat is beside the question, as the use of material with less than 25 per cent. of moisture affords no solution of the problem of finding an industrial use for peat—a problem which Frank has clearly shown resolves itself into finding a direct means of handling wet peat with 45-60 per cent. water. Caro remembers that Lymn told him of some experiments in Stockton in 1906 with peat with 40 per cent. water, and he (Caro) has published the figure in one of his papers, only to find that Lymn was in error and misled him, for the Italian peat actually used contained no more than 15-20 per cent. The latest catalogues of the Power Gas Corporation gives the moisture in the peat used in these trials as 15 per cent. Yet Lymn revives this erroneous figure in his letter to the Chemiker Zeitung, and even claims that as early as 1904 peat with 40 per cent. moisture was worked in Stockton, and yielded “large quantities of power gas and ammonia.” The yields, however, in the 1904 experiments, are known to have been bad, says Caro, and he adds that, as late as 1908, Mond assured Frank that his firm had never used peat with more than 18-20 per cent. water. The plant supplied by the Power Gas Corporation in 1907 to Sodingen lacked the essentials to successful working with wet peat, and their latest prospectus says that they first turned their attention to peat in 1905, and nothing is said there of any experiments in 1904.

Caro suggests that the matter may be judged from the fact that up to 1909 the Power Gas Corporation sold no single plant for the production of gas from peat, in spite of the alleged successful working in 1904, and in spite of the fact that in Ireland and Scotland there must be a great future for a really economic process. Nor until 1908 does any prospectus of the corporation mention peat, and the later ones, so far as peat and brown coal are concerned, rely on the Sodingen results, as examples of what may be attained. It was these results, which the Corporation was by agreement with the Sodingen Company, entitled to be put in possession of, and to exploit in certain countries, that enables them to undertake the Italian and Irish installations of 1909 and 1910. The literature prior to 1908 does not connect the Power Gas Corporation with peat at all, whereas Frank and Caro have published a whole series of papers. There follows an *ex parte* statement of a patent dispute, the detail of which is of no general interest; but incidentally it shows that Lymn applied for a patent covering much the same ground as Caro's, and the latter cannot reconcile this application with Lymn's present statement that he never considered the minor modifications in Mond's process, which render it applicable to peat, good subject mat-

ter. Caro finds himself in agreement with Lymn on one point, namely, in his admission that he (Lymn) is not the discoverer of the means of gasifying wet peat. Mond's work has its part, of course, as has always been acknowledged by Frank and Caro; but the modification of Mond's plant and process to make it suit wet peat is the work of these two and Dr. Hamers. Moreover, nothing in Mond's plant, which is especially the work of Mond and his subordinates, is necessary to Frank's and Caro's process. Many other forms of gas producers, which borrow nothing from Mond, which have nothing in common with Mond's plant but what was well known before Mond turned his attention to producers, serve equally well if modified in accordance with the knowledge based on Frank and Caro's researches. Drs. Frank and Hamers add a note expressing their agreement with Caro's statement of the facts.

PEAT DEPOSITS OF SOUTHERN CALIFORNIA.

C. V. Imeson, Engineer, Burbank, Cal.

Lying back of the sandy coast line, in the tidal marshes and low or bottom lands and along some of the rivers and smaller streams of Southern California, are found immense deposits of peat. Few articles about them have been published in journals and geological and other reports are usually silent regarding these deposits. Many persons residing within a few miles of the bogs are surprised to learn that peat is found outside of Ireland.

In one county alone, the peat lands cover an area of approximately 10,000 acres; and some excellent grades of peat, varying from the loose, spongy variety to the well-formed lignitic type that retains none of its fibrous constituents, are found.

In experiments carried on by the writer, and other engineers, some excellent results in the manufacture of peat gas for power and illuminating purposes were obtained. In these experiments, the producers used were not of the improved type but were more or less crude in construction. No attempt was made to recover any by-products; the peat, containing 30 per cent. moisture, and entirely consumed in the producer, yielded approximately 27,000 cubic feet of gas per ton, with a calorific value averaging 300 B. t. u. per cubic foot. It had the following composition:

Carbon dioxide	16.11 per cent
Illuminants	4.00
Oxygen	1.33
Marsh gas	9.20

Carbon monoxide	9.80
Hydrogen	47.96
Nitrogen	11.60

100.00

In one test made, the peat was enriched with a small amount of crude petroleum. No data were kept showing the amount of gas generated from this mixture but the results obtained were much better than where the peat alone had been used. Analysis of this gas gave 431 B. t. u. per cubic foot and its composition was as follows:

Carbon dioxide,	16.20 per cent.
Illuminants	10.20
Oxygen	.20
Carbon monoxide	7.60
Marsh gas	10.50
Hydrogen	51.16
Nitrogen	3.54

99.40

Should the entire supply of peat in Southern California be converted into gas and used to generate electrical energy, the grand total would be 15,450,000,000 kilowatt hours and worth \$154,500,000, or sufficient gas could be generated to supply a one-horse power gas engine for 3,675 years continuous run.

Peat is being used as a fertilizer and is particularly adapted to "soils deficient in organic matter." In some cases it has been used as a filler, but, as a rule, the peat is spread directly on the ground. The indications are that peat will be used very extensively in this way throughout the fruit belt of Southern California.

The following is an average analysis of four samples of peat:

Nitrogen	2.17 per cent.
Total phosphoric acid	.36 "
Potash available	.16 "
Humus available	23.27 "
Humus-forming material	48.73 "
Matter not identified	15.31 "
Moisture	10.00 "

100.00 "

The value of peat for a fertilizer in Southern California, assuming that only one-half available is suitable for the purpose, is \$105,000,000.

For fuel purposes the value is \$210,000,000, and by coking

or carbonizing it, assuming that all is suitable for this treatment and saving all of the by-products, the total value of known deposits of peat in the region under discussion, would amount, approximately to \$1,000,000,000. The climate of Southern California is particularly adapted to the manufacture of peat products as the weather will permit its being handled nine to ten months of the year.

FROM HIGH AUTHORITY.

The German Kaiser Talks of His Experience in Swamp Reclamation.

At a meeting of the German Council of Agriculture, where the principal topic was the importance of the German moor or swamp lands for agriculture, the Emperor gave a vivid account of his own experience in bog reclamation and cultivation at his estate called Cadinen.

His Majesty said in part: "I want to call your attention to a private enterprise of my own, which I have carried out on about 500 acres of peat swamp land, formerly entirely worthless. When I acquired Cadinen in 1899, it was overgrown with alders, sedges and swamp grass; naturally it brought in little revenue. A few ducks and, sometimes, a roebuck, were all that could be found on it, but to catch the buck one ran in danger of being drowned.

After a working plan was perfected it was decided to drain the land. When the scruples of the administration concerning my purse were overcome (laughter) the required funds were granted.

To prevent overflowing we first built a dike two miles long. Because the land was so low natural drainage was impossible and we erected a pumping station driven by electricity. Wires were strung across the tract so that the power could be used for threshing. By 1906, five-sixths of the land had been diked and freed from water so that an automobile could run over it. The Bremen Moor Culture Station was consulted and highly recommended a plan for farming the land. The drained surface of the swamp was covered with sand and artificial fertilizers were also used. The total cost of the work was \$18,500, or \$37 per acre. The income of the improved land in 1910 was \$3,000 (about 16 per cent. on the investment).

I wish to add that I also approve of the appeals of the German Chancellor to German Agriculture to increase its stock of cattle, so that the meat supply of the country will be independent of foreign lands. This we must accomplish, and I am

trying personally to co-operate, and I have made a modest beginning at Cadinen. The Cadinen improvements also have shown a moral success since numerous farmers from the vicinity pay annual visits and many of them have similarly improved their own land. Thus it is hoped that gradually all waste land will be recovered for agriculture."

On another occasion, in January of the winter just past, the Emperor William addressed the "Bund der Landwirte" or Association of Landed Proprietors, on the improvement of peat bogs. In the course of his address he informed his hearers that he has installed a model peat bog farm at his country seat, Schmolsin, in Pommerania.

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EDITORIAL NOTES.

The Executive Committee of this Society has held regular monthly meeting since its appointment at the rooms of the Chemists' Club, New York City. Besides giving attention to the industrial side of the Society's work, much consideration has been given to the question of interesting the large number of farmers who own swamps and bogs in the Society and its work and inducing them thereby to become members. Attempts have been made with this end in view to get in closer touch with the Colleges of Agriculture, the State Agricultural Experiment Stations, State Geological Surveys, Granges, Farmers' Clubs and Alliances and also with Boards of Trade in cities located near peat deposits. Progress in these directions has been slow, however, and it is hoped that the members generally will take an interest in it personally and assist in this movement. Correspondence is solicited. The executive committee was established at the Ottawa meeting and consists of Dr. Charles F. McKenna, Chairman; Julius Bordollo, John N.

Hoff, G. Herbert Conduct, John W. Hornsey, Herbert Philipp Sec'y. (Perth Amboy, N. J.).

Papers for the Kalamazoo Meeting.—At the meeting of the Executive Committee held in New York on March 12th the following were appointed a committee to arrange a program and secure papers for the next Annual Meeting, to be held at Kalamazoo, Michigan, in September: Prof. Charles A. Davis, Washington, D. C.; Dr. Charles F. McKenna, New York; Mr. Julius Bordollo, New York. All who have communications to present at the meeting are requested to send the titles to the Secretary at as early a date as possible, as the committee expect the program to be not only a very full one but to equal if not exceed that of the meeting of 1910.

A Good Record.—No one has been more active in securing new members than the vice president of the Western Great Lakes region, Mr. L. B. Lincoln, of Chicago, who had remitted \$55 for 11 new members when the Secretary was last heard from. Who can do better?

Peat Machinery Sought.—The following item appeared in a recent number of the Weekly Bulletin of the Philadelphia Museum: J. Lowe, 502 W. 142nd St., New York City, writes: "I have a friend in South America who is looking for machinery for developing peat deposits. I understand that a machine has been perfected in Germany for manufacturing the peat and making it ready for fuel. I should like to be advised if any such machine is made in this country and if you can give me the names of the manufacturers."

The Work of the Society.—Among the indications of the increasing value of the work done by the American Peat Society is the fact that The Mining Index of the Engineering and Mining Journal for April 1st, 1911, has indexed the papers published in Vol. 3, No. 4, of this journal.

The advantages of producer gas in continuous firing are practically endless. Primarily there is great saving of labor, as the fuel is all stored in one place and may be fired mechanically and no carting is needed. The ash from the gas producers is well broken up and it is all delivered in one place hence can be taken away by mechanical means. In many types of producers there are no grate bars to burn out. All fuel is consumed in the gas producer and little or none is carried out with the ashes. The poorest grades of fuel can be used and the gas can be forced through pipes to great distances without loss in quantity or efficiency. When burned it gives uniform and definite results, as well as constant heat because it can be regulated instantly and even automatically.

Information of a general character about peat and its uses will be cheerfully furnished to members of this Society who may wish it, by the Secretary of the Executive Committee, Mr. Herbert Philipp, Perth Amboy, N. J. Mr. Philipp has closely followed the progress of peat utilization for many years past and it will be a difficult question indeed which he cannot answer.

New Members.—The Secretary reports that the membership is slowly increasing in numbers, but that he has a strong feeling that we are not as strong as we ought to be. If every one of the old members would give the matter of interesting his friends in the work of the American Peat Society, a little time and attention, our membership would soon compare favorably with that of some of the peat societies of Europe. The Norwegian Peat Society has several thousand members and that of Germany has over 1,200, and our own—well, we hope to grow!

Italian Peat Gas-producer Plant.—At the last stockholders' meeting (Jan. 3rd, 1911), of the Power Gas Corporation, Ltd., of England, the Chairman of the Company, Sir Alfred Mond, said among other things, that the peat-producer installation for the production of power gas and ammonium sulphate, erected in Italy during the year 1910, had been successfully and satisfactorily operated for some length of time. He further stated that the company was the first to successfully solve this problem.

Chemical By-products from Peat.—The German government is so well satisfied with the progress of the industry which has been established by it in the bog districts of East Friesland, that a trained scientific lecturer was sent from Berlin not long ago to the Technical High School at Hanover to deliver a series of lectures on the subject before the students there. In these lectures the methods employed in East Friesland for making the peat into fuel were described. The product of these operations is used both for heating and in gas producers. From the latter, in cleaning the gas, ammonia, methyl alcohol, and acetic acid are recovered in commercial quantities in a well devised but simple recovery plant.

A New Fuel for Egypt.—Experiments for the manufacture of the new fuel produced from the sudd of the Nile have been taking place at Merseburg, in Germany, in which British capital (chiefly) is aided by German science. These experiments are the direct outcome of the foresight of Lord Cromer, and of his equally far-seeing colleague, the Governor General of the Sudan, Sir Reginald Wingate. One of the greatest difficul-

ties with which the pioneers of the Sudan have had to contend has been the constant blocking of its natural highway, the Nile, by masses of weedy growth, commonly spoken of as sudd. For a distance of 300 miles the Nile runs through a huge morass, estimated to cover 35,000 square miles, which is known as the sudd district. Throughout the length of this reach it is impossible to secure fuel of any kind, as the river channel has no banks, in addition to which, during the rainy season, when gales are frequent, large masses of sudd break away and block up the channel, rendering it unfit for and even dangerous to navigation. Lord Cromer realized what a serious factor this was in the retardation of the development of the Sudan, and it was a suggestion of his contained in one of his reports that led a German diplomatist, Herr von Rath, to conceive the idea of utilizing this material in the form of a cheap local fuel. The price of coal being as high as 66s. (\$16) per ton, and wood very little cheaper, encouraged the suggestion.

Negotiations were entered into with Sir Reginald Wingate, and small consignments of sudd were dispatched by the Sudan Government to Berlin for experimental purposes. The results of these experiments were so far satisfactory that further negotiations were undertaken with the Sudan Government. A considerable quantity of sudd was cut and brought back to Europe, and it was with the object of seeing this material converted into fuel that the experiments at Merseberg have been arranged. The process is very simple. The sudd is first dried and then put through a disintegrator, from which it emerges in an almost powdery form, when it is converted into briquets. The time occupied from the moment the sudd enters the disintegrator to the time it emerges as a briquet is only a few minutes. The heating value of the new fuel is nearly two-thirds that of coal, while the briquets themselves have a density of four-fifths that of coal. The cost of manufacture is stated to be comparatively small, and the use of the fuel in the Sudan would result in a saving of at least 50 per cent. on present fuel accounts. The Sudan Government, which is financially interested in the matter, has already consented to grant a valuable concession for the purpose of providing the Sudan with a really cheap and effective local fuel, which should lead to a rapid development of the resources of this wonderful country.

Headquarters for the 5th Annual Meeting at Kalamazoo, Michigan, on September 21, 22 and 23, 1911, will be at the American Hotel, Ernest McLean, manager. For reservations

and full information address the chairman of the local Reception Committee, Mr. Carl Kleinstueck, Kalamazoo, Mich.

Southern Section Meeting.—A meeting of the Southern Section of the American Peat Society will be held in February, 1912. The members of the Society living in the South are planning to hold a meeting next winter, to which they will extend a cordial invitation to all of the members of the American and Canadian Peat Societies.

Florida Peat Report.—As mentioned elsewhere a Preliminary Report on the Peat Deposits of Florida has been issued recently by the Geological Survey of that state. It is a volume of nearly 200 closely printed pages well illustrated with half tone plates showing the types of vegetation found on the peat bogs that were visited; a map also accompanies the report.

As the name of this report suggests, it is a beginning and takes up the description of the peat deposits and their floras as the first essential of more careful study later. The swamps of the state are classified and the relationship of the types of vegetation found on them to the character of the water of the region is pointed out, the basis of the classification used being the color, depth, mineral content, fluctuation, etc., of the water. After a full description of examples of the more than 30 types of peat deposits, there is a discussion of the character, composition and uses of the peat of the state, including many analyses. The book is a distinct contribution to our peat literature and should be owned by those interested in the peat deposits of Florida.

The Influence of the American Peat Society is marked from many sources. Good and encouraging tidings come from all sections of the country. Much interest is taken in agricultural lines. The New York Section meeting, held in spring of 1909 at Syracuse, induced a number of bog owners to visit the celery and onion farms of Southern Michigan. They were told that Northern New York with its extensive peat marshes was in an ideal position to reclaim these desolate lands. Since then many acres have been brought under cultivation, and land which could be bought some years ago for from \$15 to \$50 per acre, is now worth from \$400 to \$500 per acre.

This plan is now being followed in Ulster county, New York, where 2,000 acres of swamp lands along the Black Creek, near New Paltz, are to be improved and big celery farms planned. Esopus, Lloyd and other towns have formed local associations for similar purposes.

Swamp Reclamation in Florida.—"The greatest work of

reclamation east of the Mississippi now in progress, part of it done by the Federal government and part of it by private capital, will tame the hitherto inaccessible Everglades of Florida," says the Boston Herald. "The engineers of the Federal government have been able to co-operate with the State of Florida and they predict that within four or five years large steamboats will be able to navigate the canal and pass through the Everglades country to the Atlantic ocean. When the Panama canal is completed, this Floridian route will become one of the country's great waterways, saving about 300 miles around the somewhat dangerous keys of Southern Florida.

"There now are projected five canals, all to run from the Atlantic ocean to Lake Okeechobee. The most northerly of these canals will connect Palm Beach with the lake. Paralleling that and about twenty miles distant, a second canal has been planned, with its Atlantic terminal at Delray. Of the three others the lower one will have its ocean terminal near Miami.

"With the five canals stretching from the lake to the Atlantic ocean, a large area of very rich lands should be reclaimed. Furthermore, these canals, in connection with the Caloosahatchee river, are to furnish adequate transportation for ordinary coasters, thus fulfilling a prediction that some day Florida would construct a waterway connection with the Atlantic ocean and the Gulf of Mexico."

The Eighth International Congress of Applied Chemistry, to be held in New York in September, 1912, will have as one of its strong attractions the consideration of the uses of fuels. There has already been appointed a strong Fuels Committee which will be subdivided into sections. Mr. Charles A. Davis has been asked to act as a member of this committee, to take full charge of the consideration of peat as a fuel and to organize a sub-section, as chairman. The preliminary work of this organization is already under way and it is hoped and expected to have a program of papers on peat fuel that will do full justice to the subject, from the best authorities of Europe and America. The earnest cooperation of the members of this Society is invited.

The "Mitteilungen" of the German Peat Society for May 1, 1911, is a very interesting and finely illustrated number and deserves an especial mention. The principal articles are "Feuerungen für Torf" and "Ueber Staatliche Kolonisation und Industrielle Unternehmungen im Moor." The latter is finely illustrated with colored maps and photo-representations of the central electric power station near Aurich in northwestern Germany. There are also colored half tones showing the

application of electricity to farm operations on the drained bogs and the machinery which has been developed for this purpose. The above mentioned articles are both of sufficient interest to merit translation into English and republication. The editor of the *Mitteilungen* is certainly to be congratulated on being able to publish in his excellent journal such attractive and instructive articles. The colored illustrations could not be reproduced in this country except at prohibitive cost.

New York Section Meeting.—The New York Section of the American Peat Society met at the lecture hall of the Chemists' Club, New York City, on March 21st. Professor Charles A. Davis, of the Bureau of Mines, delivered an address on "The Recent Advances in the Peat Fuel Industry," and made some remarks also on the drainage of peat bogs. There was an excellent attendance and a long and interesting discussion followed the papers, during which many questions were asked of the lecturer.

The Annual Meeting for 1912.—It is yet very early to consider the meeting place for 1912 but exceptional circumstances have arisen which bring the matter before the Society at this time.

For the first time the International Congress of Applied Chemistry will meet in this country, from September 4 to 12, 1912. This is the eighth of these international assemblies in which chemists and others interested in industrial chemistry from all over the world come together to talk about the work they are doing. The place of meeting will be New York City, and the New York Section of the American Peat Society has unanimously passed a resolution to invite the Society to hold its annual meeting for 1912 at New York. This will be a great opportunity to increase the membership of the Society. It is now proposed to hold the meetings of this Society after the conclusion of the International Congress from September 14 to 17, 1912. This matter will be presented as a special order at the Kalamazoo meeting.

Doubtless most of the noted men who are interested in the development of peat power plants in Europe will attend the Congress, and some of them could be induced to present papers before the American Peat Society, if the meetings are held as proposed. The members of the Society can thus obtain information at first hands.

New Central Electric Power Station Using Peat Fuel.—A large new peat gas producer electric plant, with the recovery of ammonium sulphate as a by-product (Frank-Caro system), is in course of erection at the 250-acre peat bog of the Han-

over Colonization and Swamp Improvement Company near Osnabruck, Germany. The plant will soon start with the development of 2,000 horse power which will later be increased to 4,000 horse power. Electricity for lighting and power purposes will be furnished to the city of Osnabruck and to the surrounding agricultural districts in which there are more than 500 communities. Contracts are reported to have been made by the same engineers with a company of bog owners in Eastern Prussia to duplicate the Osnabruck enterprise. Interest in these plants is increased by the report that the plant near Aurich furnished nearly 11,000,000 horse power hours of energy during the year 1910, and it is expected this will soon be increased.

The Mark Drier has recently been tested and demonstrated at the plant of the Agar Packing Co., Des Moines, Iowa, and from the glowing reports received of its operation it has surpassed the expectations of its inventor. Samples of blood and tankage received from Mr. C. E. Mark were more thoroughly dried and pulverized than similar specimens dried by the usual methods, yet they were reported to have been dried with air at a temperature of about 40 degrees F., that is just as it was out of doors. No reports have yet been received of the costs of operating this drier.

Mr. Charles F. Kittridge, of Boston, a prominent lawyer of that city, died quite suddenly early in March of this year. Mr. Kittridge was greatly interested in peat utilization and in the work of this Society. He was present at the Boston and Ottawa meetings and was a strong advocate of the plan of incorporating the Society as a matter of proper business procedure, at both of these meetings.

Peat in Canada.—The interest in peat and its development and use in Canada so manifest at the annual meeting in Ottawa continues apparently unabated. From several sources it is learned that the fuel sold last fall from the Department of Mines demonstration plant proved very satisfactory to those who purchased and used it. This was especially true of the people who burned it as auxilliary fuel in grates and properly designed stoves, and several of these, it is reported, have said that they would be entirely satisfied to pay a premium for peat fuel for such purposes. Those who attempted to use peat for heating during severe weather in furnaces designed for burning hard coal, as could have been predicted, found the task of firing somewhat strenuous on account of the small size of the fire boxes, and the bulkiness of the fuel.

Reports of the establishment of several peat fuel plants

and a litter factory have been current, and the Government peat expert and his assistants have been kept busy answering the enquiries which have poured into his office.

Still another sign of interest and activity was the first meeting of the Canadian Peat Society late in March, at which permanent organization was effected and a good program presented. A full account of this meeting is given in another place.

It will also be noted in the list of publications that Dr. Haanel delivered an address on the peat industry and its possibilities for Canada before the Canadian Club in Toronto during the winter, which aroused great interest, and was quite widely printed in technical journals so that it is already well known.

The engineering and technical journals have made many references to the peat fuel plant at the Alfred bog and it has been fully described and illustrated in a number of places. All of these notices are straws showing that the wind of public interest is surely setting towards the intelligent use of peat as fuel.

Peat Bogs of Canada.—A newspaper clipping from Windsor, Ont., forwarded to the Bureau of Manufacturers by Consul Harry A. Conant, states that there are 12,000 square miles of peat bogs in Ontario and Manitoba, enough to supply 5,306,076 families with fuel equal to ten tons of good coal each for 100 years. In 1909 Canada imported nearly 10,000,000 tons of coal worth \$26,831,859, which sum the newspaper thinks might be kept at home if peat were used.

These figures will doubtless be modified by more thorough and careful study of the peat deposits, but they are more likely to be increased than decreased, even though, as is pointed out in this number of the Journal, some areas included in the present estimate may prove unproductive.

PERSONALS.

Dr. T. A. Mighill and Mr. James MacKaye, his associate on the scientific staff of Stone and Webster, recently passed through Washington, D. C., on their return from a business trip to Georgia and Florida. Incidentally they made a very pleasant call on the Editor and gave him some new ideas about the peat deposits of the south.

Mr. F. J. Bulask reports business very good in his section of the country.

Mr. Julius Bordollo and Dr. C. H. McKenna, of New York, recently have been making tests in peat beds in various parts of New Jersey with a view of locating some suitable for

plants. They do not expect however to go into making peat this season.

Dr. Joseph Hyde Pratt, State Geologist of North Carolina, the first President of this Society, reports that drainage work in his state is progressing very rapidly and satisfactorily. It is his hope to have the great areas of swamp land lying on the coastal plain, converted into farm land in the near future. The swamps of the region, wherever drained, have proved very fertile and produce large crops, sometimes as many as three successive crops being taken from the same land in a single season. Dr. Pratt hopes to be at Kalamazoo to tell us about this important work.

Mr. Robert Ranson, of St. Augustine, Fla., who spent several months in England during the fall and winter, returned to his home in April. Mr. Ranson was accompanied to this country by Mr. F. G. Fogg, representing the Power Gas Corporation, Limited, of Stockton-on-Tees, the manufacturers of the Mond Gas-Producers and Ammonia recovery plants. This company reports in its latest catalogue that it now has three large gas-producer power plants with sulphate of ammonia recovery equipment, successfully running on peat, one in England, one in Germany and a third in Italy; peat with as high as 60 to 70 per cent. of water, it is claimed, is used successfully in these plants.

During the working season of 1911, beginning with April 1st and ending November 1st, the address of L. B. Lincoln will be Imperial Bank Chambers, Montreal, Canada. Mr. Lincoln has made an active campaign during the winter and has made a goodly number of converts to this Society besides developing an entirely new model portable peat fuel plant.

Louis H. Owen, of Chicago, of "Hello Peat" fame has been making his headquarters in New York for some months. He has identified himself with the National Peat Fuel and Gas Company.

The Crescent Manufacturing Company, of Crescent City, Fla., it is reported has disposed of its bog, fertilizer filler factory and business to the Virginia and Carolina Fertilizer Company. The new owners will remodel and increase the capacity of the plant and use the product in their various factories. Mr. J. Wagermann, formerly with the Springfield Filler Co., is reported to be the manager of the new enterprise.

The National Peat Fuel and Gas Co., have maintained a small experimental and demonstration plant in Jersey City, N. J., during the winter, testing samples from various sources

to demonstrate the character of the work and the adaptability of the peat machine and drying process developed by P. Heseltine and used by him at Bancroft, Mich., during the season of 1909. This company, it is stated, will erect and operate at full capacity a completely equipped unit of the peat fuel factory designed by Mr. Heseltine at some place within easy reaching distance of New York City, during the present season.

The Peat Products Co., according to recent information will soon have its peat briquetting plant at Lakeville, Ind., in full operation. The plan of digging and transporting the peat from the bog to the factory storage basins by the use of a centrifugal pump has already been given a trial and is reported to be very successful. The rest of the installation was nearly completed and a full season's work is planned.

The peat filler plants are generally reported in full operation with a growing demand and better prices than ever before. The business seems likely to grow rapidly from this time on, especially if the users of the peat for fertilizer filler come to realize that it is even more valuable mechanically in many mixtures, than it is chemically, as a source of nitrogen.

Peat promotion seems nearly at a standstill, if newspaper activity is any indication. Very few notices of the formation of new companies and of the starting of new enterprises for utilizing peat for fuel or other purposes have been received by officers of the society. Enquiries for information have been numerous but other signs of activity, to those depending on the newspapers, have been fewer than for some years past.

This is a sign of progress, if it signifies that the investing public is so well educated that it now wishes to be shown how peat fuel can be made and sold before investing any more funds in peat plants.

NOTICES OF PUBLICATIONS.

The Exploitation of Peat Bogs: Metallurgical and Chemical Engineer, 9:2:78 and 79, Feb., 1911.

An abstract of Dr. Eugene Haanel's presidential address at the Ottawa Meeting of this Society.

The Utilization of Peat: An address given by Dr. N. Caro, at the Twelfth Annual Meeting of German Scientists at Königsberg (Abstract from *Electrotechnische Zeitschrift*, 31:1140 (1910).)

A description of the gasification of half wet peat and the obtaining of by-products, by the Frank-Caro process, which permits, for the first time, the rational use of peat on a large

scale, and becomes, therefore, an important factor in peat utilization. This method opens up a new source of power, which can compete with water power.

The Recovery of By-Products from Peat, R. W. Hilgenstock. *The Chemical Engineer*, 13:5:125-126, Nov., 1910, Ill. Describes methods and apparatus for recovering at the German power plant in East Friesland, ammonia, wood alcohol and acetic acid from producer gas.

Government Peat Bog at Alfred, Ontario: *The Canadian Engineer*, 20:452-454 (3:23, 1911.) 10 illustrations.

Investigations of the Peat Bogs and Peat Industry of Canada, During the Season of 1909-1910: Aleph Anrep, Jr., Canada Department of Mines, Bull. 4, 1910, 2nd Ed. Brussner, Komoka, Brochsville, Rondeau and Alfred bogs mapped and described.

Discussion of priority of patents on power-gas and ammonia extraction from peat: Dr. N. Caro, A. H. Lymn and Dr. H. C. Woltereck, *Chem. Zeitung*, Feb. 23, 1911, p. 207.

On the Dr. M. Ekenberg Wet-Carbonizing Process: Alf Larson. (Translated from the Swedish from *Tekisk Tidskrift*, Dec. 26, 1908, by A. Anrep, Jr.), Canada Department of Mines, Bull. 4, 1910.

The Ekelund Process for the Manufacture of Peat Powder: Harold A. Leverin, Canada Dept. of Mines, Bull. 4, 1910.

Experiments on the Availability of Nitrogen in Peat: L. H. Lipman. Report of the Soil Chemist and Bacteriologist of the N. J. Agri. Coll. Exp. Sta., 1909, pp. 188-195.

Taming of the Wild Blueberry: F. V. Coville, *Nat. Geog. Mag.*, Feb. 1911, Ill.

Fuel Resources of the United States. Robert H. Fernald; *Cassier's Magazine* 5:1911:85-89, interesting article on the general fuel resources of the country with about a page (89) on peat.

Report on Peat as Fuel by the U. S. Geological Survey. Fuel; 17:1:16 (May 2, 1911). A review and notice of "Peat Production in 1909." reprinted in this Journal.

The Fuel Supply of the Central Provinces and Its Economic Use. (The Possibilities of Canadian Peat), *Canadian Mining Journal*, 32:4:123-126 (Feb. 15, 1911.) An address delivered by Dr. Eugene Haanel before the Toronto Canadian Club. The Fuel Resources of these provinces are: 1. Wood, still standing. 2. Oil deposits. 3. The oil contained in the

oil shales of New Brunswick. 4. The Lignite of Manitoba. 5. Water powers, the "**Ouille blanche**," or white coal of the French. And 6. Peat deposits with which the address principally deals.

Reclaiming the Everglades. Day A. Willey; Cassier's Magazine, 39:5:418-432, March, 1911. Many half tones. An account of the method by which the State of Florida is draining millions of acres of land for agricultural purposes.

Tile Drainage for Reclaiming Wet Lands. C. G. Elliott, Engineering News, 65:9:269, March 2, 1911. "The most unique field for the use of drain tile may be found in the moors of Germany. There are more than 5,000,000 acres of these lands, most of them in government ownership, which yield no revenue and support but few people. Notwithstanding the efforts so far made to reclaim and cultivate this vast area of waste land only about 15,000 acres have been converted into productive fields. The land is virtually a bog with water lying at the surface and held by the spongy peat of which the moors are composed. In the most approved process of reclamation drain tiles two inches in diameter are laid in lines 65 feet apart and $3\frac{1}{2}$ feet deep. The very salutary effect of this drainage combined with subsequent special treatment of the lands has proved that they can be reclaimed at a profit." "Medium soft tiles of brick clay, when immersed, absorbed about 20 per cent. of their own weight of water. When subjected to tests for several days, the following conclusions were deduced regarding the ease with which water should pass through the walls of the tile. If a field were drained with lines of six-inch tile of this quality fifty feet apart, and no water permitted to enter through the joints, it would require 139 days for them to remove 1-4 inch of water from the land. With three-inch tile, it would take 250 days to get the same result. In other words, if the joints of a drain composed of these tile were closed, it would take 139 and 250 days respectively for them to accomplish the drainage which is ordinarily done by such tile, as usually laid, in one day."

Handbook of Explosives for Farmers, Planters and Ranchers. E. J. DuPont de Nemours Powder Company, Wilmington, Del. Tells how to clear land of stumps, boulders or trees, dig ditches, grade roads, etc., with the DuPont explosives.

Denatured Alcohol. U. S. Department of Agriculture, Bureau of Chemistry. This Bulletin shows the difficulty of making alcohol for industrial purposes from farm refuse in small plants.

Heide und Moor. Dr. Adolf Koelsch, Cosmos, Gesellschaft der Naturfreunde Stuttgart, Germany. Price one mark; post-paid, 1.80 mark (45 cents). Illustrated with plates and text figures. A very interesting and valuable account of the heath and bog lands of Germany and their plant-life and especially adapted for nature-study work on these interesting types of habitat. The parallelism between the bogs of New England and some of those described is very striking.

Untersuchung von Moorboden, Torfstreu, Torfmull und Brennstoffen. Insp. Bersch Verband der landwirthschaftl. Versuchstationen in Ostereich. Wein; April, 1911.

Die Gewinnung von Brenntorf nach dem Dr. Ekenberg-schen Verfahren. Dr. Dierfeld, Dinglers Polytechnisches Journal Band 325:1910; pp. 151, 183, 199.

Die Ausnutzung unserer Torfmoore. Carl Heinz, Zeit schr. d. Vereins dtsch. Ing. 35:368, 1911. A discussion of the value of the peat deposits of Europe as source of power, which in the judgment of the author can be most profitably obtained by gasifying the peat, and recovering by-products, especially ammonia. If there is more power generated than needed, it can be used for making calcium nitrate.

The Advance Made in the Manufacture of Peat Fuel in 1910. Ernest V. Moore. The Canadian Mining Journal, Mar. 1911, 32:5:143-149, 7 illustrations. Gives a description of the Alfred peat fuel plant of the Dominion Department of Mines, and analyzes the costs of production, quoting the figures given out in full. The paper also describes the new Anrep excavator and the other recent improvements made by this inventor; the excavator and method of handling peat developed by Lieutenant Ekelund are discussed and the author shows how these decrease the costs of production for machine peat.

Opportunities for Peat Mining in North America. Geo. Ethelbert Walsh; Mining Science, 63:1631:469-471, 1 illustration. Gives short history of peat utilization abroad and in the United States and Canada, and points out the general neglect of the resource and some of the advantages that might come from its use in parts of the country where it is abundant.

SOME RECENT PATENTS ON MACHINERY AND PROCESSES OF TREATING PEAT.

Treatment of Peat Fiber and Its Manufacture Into Paper, Etc. L. Franz, U. S. Patent No. 945,313; Jan. 4, 1910.

Apparatus for Treating and Utilizing Peat Fuel. W. L. Shepard and H. J. Wickham, U. S. Patent, No. 946,788; Jan.

18, 1910.

Machine for forming peat into blocks. W. L. Shepard and H. J. Wickham, U. S. Patent No. 986,85; Jan. 3, 1911.

Drying Apparatus for Peat and the Like. C. A. Mattheson, U. S. Patent No. 957,232, May 10, 1910.

Peat Machine. Philip Heseltine, U. S. Patent No. 962,349, June 21, 1910.

Gas from Peat. J. D. Oligny, assigned to the Peat Gas and Coal Company, Montreal, Canada; U. S. Patent No. 9,469, Dec. 6, 1910. French patent No. 409,263, 1909.

Recovery of tar vapors in the dry distillation of coal, wood, peat or similar materials. Belgium Patent No. 230,020.

Artificial wood from peat. Patented in England by S. J. Davies and J. Rowell; is made from 75 per cent of peat moss, 10 per cent. of starch, 10 per cent. of glue, and 5 per cent. of formaldehyde, carbolic acid or tannic acid. Boiling water is added to the glue, starch, etc., and the peat moss is worked into the mixture to form a thick paste, which can be molded or formed under heavy pressure into a great variety of articles. The composition, claimed to be a satisfactory substitute for wood and other substances, has some advantage over natural wood.

Carbonization of finely divided wet fuels. A. Blezinger; German Patent No. 233,216, Apr. 14, 1910. The fuel is preheated to such a degree that when charged into the gas-producer, the water and bituminous vapors carried upwards by the producer gas are not condensed on the freshly charged-fuel.

Peat preparing apparatus. W. H. Bradley; U. S. Patent No. 962,120, June 21, 1910.

Process for Treating Peat. Gustaf E. Boberg, Alameda, Cal., U. S. Patent No. 993,143. The process consists in the removal of all foreign matter from the peat at the same time adding a liquid to it. The peat is then passed through a vacuum chamber and boiled; afterwards molded into briquets and dried.

Gas-Producer System. Gustaf Akerlund, Atlanta, Ga., assignor to The Gibbs Gas Engine Co., U. S. Pat. No. 992,840.

A System of Briquetting Peat. Theodor Franke, Wiesbaden, Ger., Ung. F., No. 2,474.

Gas from the dry distillation of coal, wood, peat, etc. A process for condensing tarry vapors. H. Puning, French Patent, No. 422,023, Oct. 31, 1910. The tarry matters suspended in coal gas, etc., are deposited by means of an electric discharge through the gas. To obtain a complete separation, the arrangement must be such that all parts of the gas are subjected to the discharge and an enlarged surface for the deposition of the tar must be provided, as by flattening the pipe, fitting grids therein, etc. Different qualities of tar may be obtained by carrying out the process in stages, for example at 300°, 250°, 200° and 150°C.

Peat Charcoal. L. A. H. Galvaire, Fr. Pat. 422,300, Jan. 15, 1910. Process and Apparatus for Manufacture of Peat Charcoal.

Most of the water in the raw peat is removed in a filter press. The peat is then fed mechanically into a grinding machine where the fibers are cut and triturated, and eventually formed into briquettes. The briquettes are dried and carbonized in coke ovens, provision being made to collect the by-products.

Ammonia from Peat. H. C. Woltereck and The Sulphate of Ammonia Co., Ltd., London. Br. Pat. 15,285, June 25, 1910. Process of producing ammonia from peat.

Exhaust gases, free from ammonia and other volatile products, together with air and steam are passed over heated peat. The oxygen content is kept low to prevent combustible compounds forming. The temperature of the reaction is 600-800°C.

FIRST MEETING OF THE CANADIAN PEAT SOCIETY.

The first annual meeting of the Canadian Peat Society was held in the board of trade rooms in Ottawa, Ont., on the afternoon of Tuesday, March 28th, 1911. The following officers were elected for the coming year: Honorary president, Dr. Eugene Haanel, Dominion Director of Mines; president, Dr. J. M. McWilliam, London, Ont.; vice-president, J. M. Shuttleworth, Brantford, Ont.; executive council, A. W. Fleck, John R. Reid and Frank Pedley, Ottawa; secretary-treasurer, Arthur J. Forward, Ottawa. The following honorary members were also elected: Hon. William Templeman, minister of mines; Hon. Clifford Sifton, chairman of the commission of conservation, and Professor Charles A. Davis, United States government peat expert.

The attendance at the meeting was large and representative, and the greatest interest was manifested by all, quite

a number of new members joining during the progress of the meeting. An interesting feature was the reading by the secretary of a number of letters received from purchasers of peat fuel in Ottawa, expressing the highest satisfaction with the new fuel and a general desire to secure larger amounts this year.

Among the letters received was one from Sir Richard Scott referring to efforts made by him upwards of thirty years ago to interest the government in the utilization of the peat bogs of Canada, which failed owing to the primitive methods then in vogue in manufacturing peat fuel in this country.

At the request of the president, Mr. E. Prouix, M. P., made a few remarks, expressing his great interest in the development of the peat industry and promising active co-operation in any movement for its advancement.

The question of approaching the government to ask for a bounty on the production of peat fuel was taken up and on motion of Mr. Prouix, was referred to the board of directors for investigation and such action as might appear to be for the best interests of the industry.

Interesting papers on the peat bogs of Manitoba, the peat societies of Europe and the Anrep peat machinery, were read by Messrs. L. B. Lincoln, A. Anrep and Ernest V. Moore respectively.

At five o'clock the delegates adjourned to the government fuel testing plant where a peat gas power plant was studied in operation. This has a capacity of production of 40 horsepower, and operates an ore crushing and sampling plant. Mr. B. F. Haanel, engineer in charge, who showed the party over the plant, gave some most interesting figures illustrating the low cost of production from peat, stating among other things, that with fuel costing \$2 per ton for production at the bog, the tests made had shown that power from peat gas could be successfully produced at \$7.50 per annum per horsepower for a ten-hour day.

The meeting closed with all who were present pronouncing the first annual a great success and one that augurs well for the future of the society.

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A CRITICAL REVIEW OF F. T. GISSING'S COMMERCIAL PEAT: ITS USES AND POSSIBILITIES.

Herman C. Woltereck, London, Eng.

(Read at the Ottawa Meeting.)

The author of this work was jointly responsible with the late P. R. Bjorling for the publication of "Peat: Its Uses and Manufacture."

In this publication a great feature was made of the now notorious electro-peat-coal process, the promotion of which ended in the law courts with charges of fraud against its promoters. Mr. Gissing has consequently omitted all reference to this process in his new work, but it is to be regretted that he has included reports on a number of other processes which have partly been exposed as frauds and the commercial uselessness of the larger part of which has been demonstrated by the failure of the companies formed to exploit the same.

Since Mr. Gissing has the kindness to thank me for my co-operation and encouragement, which only extended to the process owned by the Sulphate of Ammonia Co., Ltd., I must regret that he did not inquire for any information in my possession regarding some of these processes.

One of the most notorious frauds ever attempted to be unloaded on the British investor is the Alcohol from Peat process alleged to have been invented by Reynaud.

The following article was written by me in 1908 and sent to the editor of the "Engineering Magazine" as a reply to an article by Thos. L. White published therein (August, 1908). It was, however, refused publication. It speaks with the authority of official facts and should remove all illusions on the subject:

Alcohol from Peat.

Owing to the renewed attempts to make propaganda for this process by means of inspired articles in the press which bear all the earmarks of a fraudulent company prospectus, and in view of the article signed by Thos. L. White and published in the "Engineering Magazine" of August, 1908, it may be of interest to view the authenticated facts in connection with this process and to consider its history as far as it can be ascertained through official sources.

(A) First attempts were made in 1901 to produce alcohol from peat by the French engineer, Reynaud, who, assisted by Baron von Fock, formed a German-French company, and large works were erected at Aalborg, Denmark, which were to produce 10,000 litres of 5 per cent. alcohol (equal to 500 litres 100 per cent. alcohol), per day.

Mr. V. Frestadius acquired the Reynaud patent for Sweden and the works at Aalborg were placed at his disposal for experiments on a large scale. (A)

In the Austrian periodical, "Zeitschrift fur Moorkultur und Torfverwertung" (1905), the proposal to produce alcohol from peat was clearly characterized and the article winds up as follows: "In the interests of the whole peat problem it is to be desired that nobody may be found to devote his capital to **this hopeless proposal, which would only create embittered adversaries to the great problem of the rational utilization of peat instead of gaining convinced adherents.**" (B)

On November 26th, 1906, Dr. Von Feilitzen (the Director of the Swedish Moor Industry Society), reported to the Technical Society of Joenkoeping, Sweden, that this process had received a subsidy from the Swedish government of 10,000 crowns, which were to be repaid within two years in case the process did not prove the promoters' representations.

He further reported that the government expert, Dr. Ekstrand, had made exhaustive experiments, which agreed with his own (Dr. Von F.) that not more than 7 litres of alcohol, or 5.22 per cent. by weight, can be obtained per 100 kg.* of dry peat by this process and that the cost of raw materials to produce one litre of alcohol would be 15 oere (2d), **not including the cost of fuel, acid and labor or amortization on plant, etc.** The cost of material, acid and lime was placed at 19.2 oere. It is to be observed that the **selling price of one litre for power purposes** in Germany is equal to 14.1 oere (about 2d) (C), or at less than the cost of material, acid and lime alone.

After thus ending his career in Sweden, the promoter came to England, and it will be remembered that it was widely stated

*70.4 litres per 1,000 kg. equals 15.5 gallons per one ton.

in the press that by the use of this process, Irish peat would be turned into alcohol, and that this alcohol would be sold under 3d per gallon and would supersede petrol for use in motor cars, etc. (D) Previously, Sir William Ramsay (E) reported on experiments **made by Frestadius** under his supervision, that he obtained between 25 and 36 gallons of alcohol to a ton of dry peat by this wonderful process, **or over double the quantity obtained by the Swedish Government Expert.**

Professor N. Steenberg, who had been commissioned to visit the works for the production of alcohol from peat in Wildmosen near Aalborg (Denmark), so much discussed some time ago, has now, after completing his experiments with the products there obtained, characterized the whole scheme as a gigantic fraud. (F)

The inventor, Reynaud, had promised to extract 20 per cent. of alcohol from the peat, but obtained only 5 per cent.

Professor Steenberg had formerly warned against the undertaking, as he did not trust Reynaud's statements; but the millions which were promised as profits overcame all doubts, and the trial plant at Wildmosen was erected. This was done in a very slipshod manner, and large sums of money were wasted against all common sense. Some time ago, the Swedish government sent an engineer to inspect these works, who had great hopes at first, but, as he made some experiments with peat on his return, he did not succeed in obtaining more than 5 per cent. of alcohol, the same result as was obtained by all other chemists except by Mr. Reynaud. (F)

After dealing with the competent and semi-official literature on the subject and before dealing in detail with Mr. White's article it will be necessary to make a few remarks as to Sir William Ramsay's report on the process, as reported, in the journals referred to (E).

It is to be noted that the report is stated to have been given by Sir William Ramsay upon experiments **carried out** under his control by Mr. Victor Frestadius, who represents the Swedish Company, "Aktiebolaget Tourbiere."

Sir William reports to have obtained as the result of two experiments, the equivalent of 25 gallons and 36 gallons per ton of dry peat respectively.

Naturally the accuracy of these results cannot be questioned, but there is no proof, though a grave suspicion, that the peat used had been treated to a considerable dose of sugar or starch before innocently posing as "dried and compressed peat obtained from Ireland."

It will not be necessary to consider the introduction of Mr. White's article, but simply to specify the various misleading statements it contains.

On page 743 is found: "In the light of the **successful manufacture** of alcohol from peat by Lagerheim and Fres-tadius, two Swedish chemists, * * *" this statement is contradicted by the reports of the Swedish and Danish Government Experts, Ekstrand and Steenberg.

The statement on page 745 that the alleged inventors had found saccharifiable matters other than cellulose in peat and that they relied rather on these than on the inversion of the cellulose is a bare falsehood.

It has been definitely proved that the pentosanes found in the peat furnish non-fermentable sugars on inversion and can therefore not furnish any alcohol. (C)

The claims to a special efficiency of the yeast prepared from a mysterious berry "found growing on the bogs," has also been disproved by the government experts. (C)

Not satisfied with the high results obtained from the doctored peat by Sir William Ramsey (25 to 36 gals., resp.), a yield of 30 to 40 gallons is cheerfully claimed on page 747.

Mr. White has also been rather careless in his statements. On page 746 he states that "the acid, a portion of which is returned from the vats to the autoclaves instead of being wasted," and forgets that he neutralized this acid on page 744 with carbonate of lime, and necessarily so, as he would hardly get any fermentation in the presence of such an excess of free acid.

The large works erected near Aalborg, Denmark, after having given up the struggle for the impossible early in the year 1908 are now for sale, either as a whole or in parts, and the dream of the Danish bog owners of the fabulous wealth promised is over.

The following gives an exact translation of the report published: (G).

"The End of the Danish Alcohol from Peat Works."

The Danish Peat Journal, "Mosebladet," reports in the July issue (1908) on the present finish of the Alcohol-from-peat problem in Denmark, where a company had carried out experiments during several years for the production of alcohol from moss peat at a large plant in the "Lille Wildmose" (little wildmoor) near Aalborg, as follows:

"Early in 1905 a number of merchants from Rendborg with a French engineer (Mr. Reynaud) and a German engineer, formed a company at Aalborg to exploit an invention of Reynaud, who, according to the publication in the 'Aalborger Amtsblat' (Aalborg Official Gazette) pretended to be able to produce up to 25 per cent. of alcohol from moss peat. In confirmation of these statements he produced a certificate given by the Pasteur Institute at Paris.

Scientific investigations, however, have already demonstrated earlier that a yield of only about 6 per cent. could be counted on, for which reasons the endeavors of the French experimenter were regarded skeptically.

A fortnight after the preliminary steps of the in "Alcohol-from-peat" interested parties at Aalborg, the first building materials were delivered, to the surprise of the doubters, in the "Lille Wildmose," where Count Schimmelmann had sold about 300 Joch (400 acres) of peat bog to a German-French company with a large capital for 300,000 Kroner, (£16,489) in shares of the new enterprise, (at the head of which were Rehder, a merchant of Rendsborg and Reynaud).

In greatest haste the works were erected, though most of the buildings in wood only. Only the chimney and the boiler house were in brick. The machinery required was mostly second-hand. The steam engine came from a bankrupt sugar works at Otterslo, and the two large boilers from a textile works in Saxony.

In December, 1905, the buildings were completed, the machinery mounted and the works ready for operation, which was calculated for 6,000 Pottmass of alcohol (1 Pottmass: 0.966 litre) in 24 hours and was to employ 40 men, in day and night shifts (continuous operation being carried on).

In the freight bills of the Hadsundrasway (on which the works were erected) shipments of alcohol from the station of Kongerslev are looked for in vain in the years 1905-1908. In the three years of the existence of the works, hardly a total of 6,000 Pottmass of alcohol were produced.

Once, 4,000 Pottmass(=3,864 litres=860 gals.) of alcohol were really produced by means of forced working (?); finally, however, Reynaud declared the whole work as only an experiment.

When on a fine day a cargo of maize arrived at Aalborg for account of the alcohol-from-peat works, this gave a welcome opportunity for the doubters to explain the production of alcohol from peat in their own manner.

All those who had put their hopes in the new process continued to pretend that in the distillation no deception had taken place in that direction.

They claimed to have really succeeded to obtain alcohol from moss peat exclusively. Of the yield, however, outsiders received no information. Reynaud pretended to the last that the experiments had been successful.

At one time the works employed 100 men: mechanics, engineers, laborers, servants, etc. Building went on continuously, the money rolled, and the dealers of Kongerslev and Dokkedal did a roaring trade. The operations were managed

by Director Jacobson from Copenhagen and a cand-pharm. Steenstrup. The works were closed down since January of this year. During the last months, a Russian engineer, Eugen Tornanski, excepted, who lived with his wife at Dokkedal, no living human soul was to be found inside the works."

Tornanski published in different daily papers the following advertisement:

"The Alcohol-from-peat works, situated in the 'Lille Wildmose,' are to be sold by the proprietors (the French-German Alcohol-from-Peat Co.) either as a whole or in parts. All detailed information will be given by Engineer Eugen Tonnanski, Dokkedal. The works may be inspected after preliminary notice, on any Sunday."

The works were valued and entered in December, 1905, immediately after their erection, at 200,000 Kroner (\$54,000).

Later further buildings were erected and new machines purchased.

All directors, contractors and pharmacists had very high salaries, up to 25,000 K. (\$6,750) per year in some cases.

During the winter months, 1905-1906, the working expenses were 1,200 K. (£65) every 24 hours. It will not be far from the correct figures if the total capital spent since 1905 is estimated at between 1,000,000 to 2,000,000 Kroner (£55,000-£110,000).

Now the end has come. Assets are to be realized, on the whole or on part. But can buyers be found to drag the heavy boilers out of the moor?

People in touch with the company pretend that the works are only to be moved to another locality, and to make a profit possible, are to be transplanted to the coast or by rail into the interior.

But few, however, believe these statements, and the sales advertisements in the papers talk in reality quite a different language. The adventure at the Wildmose is at an end.

It is a pity that a large sum was lost. The local people, however, may be consoled that, thanks to the warnings which the peat society (Moseselscabet) did not fail to give, they will hardly suffer any but nominal losses.

This occurrence will, however, not be able to influence the general opinion of the importance of the peat problem in any manner (W. C. K.) (G).

Literature.

- A. Zeitschrift fur Moorkultur und Torfverwertung, 1905, p. 196.
- B. Zeitschrift fur Moorkultur und Torfverwertung, 1905, p. 198.
- C. Zeitschrift fur Moorkultur und Torfverwertung, 1906, p. 258-261.

- D. Zeitschrift fur Moorkultur und Torfverwertung, 1908, p. 81-83
- D. The Car, No. 267, July 3rd, 1907, p. 339.
- E. The Civilian, Sept. 14, 1907, p. 355-6.
- E. The Automotor Journal, July 20, 1907, p. 102, 8-9.
- F. Chemiker Zeitung, No. 66, Aug. 15th, 1908, p. 784.
- G. Zeitschrift fur Moorkultur und Torfverwertung, VI. No. 5, Oct. 24th, 1908, p. 277-9.

The foreign journals referred to above are on file in the library of the patent office (London).

The above ended the fraud as far as Denmark and Sweden were concerned, but the English faithful were worked for all they were worth until late last year. It is now understood that they have also at last been convinced of the failure of the process and of the falseness of the pretensions of the alleged inventors.

3. Nitrates from Peat.

A few words will be sufficient to dispose of the pretensions of this scheme. The fundamental idea is the transformation of ammonia into nitrate with the secret hopes of getting more nitrogen out as nitrate than has to be put in in form of ammonia. This is only a beautiful dream which has not been realized by results. The slight difference between the price of nitrogen as ammonia and as nitrate make the execution of this process illusory.

4. Ekenberg Wet-Carbonizing Process.

The "wet carbonization" process of the late Dr. Ekenberg is scientifically a very interesting and ingenious one. As to its availability for commercial purposes, that was already settled by the Swedish government experts in 1906, when the works erected at Stafsjo, Sweden, partly at the expense of the Swedish government (with a subsidy of 20,000 Kroner, or £1,100) were abandoned as a failure. Pictures of these works, shown in Gissing's book, have been regularly used by Ekenberg when fishing for English dupes. In 1907 I advised a well-known stock broker, who was one of the chief interested parties in the promotion of a syndicate for the Ekenberg process, of these facts, and of the reasons of the failure, which were excessive cost of plant and consequent extreme fixed charges and the very large amount of fuel required (one ton of **dry peat** to produce one ton of briquettes). Nevertheless the English syndicate was formed and works were started on Dartmoor, another addition to the ruins caused by unscrupulous methods in the promotion of impossible processes for the utilization of peat.

Ekenberg had a good press; articles praising his process appeared in many standard journals (*World's Work*, August, 1908; *Engineering*, May 28, 1909; *The Graphic*, January 16, 1909; *Iron & Coal Trades' Review*, July 17, 1908), and he read papers before many learned societies. In the end he himself, however, became dissatisfied with the fuel question and endeavored to implant the Mond process on his own to reduce an excessive cost of fuel.

However, the final judgment has been pronounced by Dr. L. Wolff in the "*Mitteilungen des Vereins zur Foerderung der Moorkultur im Deutschen Reiche*" of December 15, 1909. In an exhaustive article Dr. Wolff deals with the misleading statements and calculations of Ekenberg, as contained in his paper read before the Iron and Steel Institute in May, 1909, in the form of a dialogue, and shows up its inaccuracies and misstatements in elementary fashion. He finally settles the fate of the problem as follows:

"Perhaps I might have saved the reader and myself much labor if I had shown from the first that the result of the wet carbonization, the production of simply (1x) wet peat (peat with 50 per cent. of water) has been very well achieved up to the present, by the ordinary process of air drying. Only the further drying is rendered difficult by the weather and climate, so as to require sheds, or other expensive installations, and much time. This proportionally low grade preliminary drying takes place practically in any kind of weather in the open air, and if a process is employed to employ such simply wet (50 per cent. water) peat usefully, the 'wet carbonization' is superfluous."

Before everything else, however, air-drying will save one-half (i. e. 400 tons daily) of the raw peat to be cut, and for that alone some arrangements to assure a supply during too unfavorable months may well be made. And that is also very much simpler than "wet carbonization."

Dr. Wolff calculates the **fixed charges alone** (amortization, depreciation and maintenance) of an Ekenberg plant for the production of 50 tons briquettes daily at 40 marks or \$10 per ton of briquettes, which render the proposition an absurd one.

5. Utilization of Peat.

Peat Gas. This chapter mixes a good many true facts with the fairy tales of unscrupulous manipulators and fraudulent company promoters.

As a matter of fact, peat gas has established its value, even without the additional advantages with which skillful "faiseurs" have endeavored to surround it. Peat gas plants have been operated with success for years in many countries, and among

the most successful ones are those erected in Sweden by Messrs. Gebruder Körting, who were the pioneers in this direction. The use of peat for the production of power gas is justified in all localities in which coal cannot be obtained at reasonable average prices.

However, the promise of sulphate of ammonia as a valuable by-product has led to the development of a peculiar position.

When Dr. Mond developed his gas producer he had as chief object in view the recovery of as big a percentage of ammonia as possible. For this purpose he reduced the temperature generally employed in power gas producers by the use of a large excess of steam. The result was that if a good yield of ammonia was recovered the gas produced simultaneously was practically without value, its calorific value being in some cases as low as 80 B. T. U. However, the truest criticism was that contained in an editorial of the *Journal of Gas Lighting*, etc., of May 21, 1907, which was based on the exhaustive experiments of Dr. W. A. Bone and Mr. R. Vernon Wheeler, and sums up the situation in a very few words: "The relevance hereto of the research conducted by Dr. Bone and Mr. Wheeler lies in the fact that they have demonstrated by exhaustive practical trials that when a Mond gas producer is operated so that it becomes a reasonably efficient gas-making machine, it ceases to yield a relatively large quantity of ammonia. Indeed, under such conditions, ammonia recovery must generally be abandoned as unprofitable." Here is the case in a nutshell: Either a relatively large yield (up to 50 per cent. of the nitrogen present in the coal—no more) of ammonia and a large quantity of a very poor and practically useless gas,—or a power gas of ordinary quality, which might have been produced by any simpler and less expensive producer and a yield of ammonia so small as to render its recovery unprofitable.

However, the Power Gas Corporation, the sole licensees of the Mond process in England, made experiments with peat, both at Winnington and Stockton, and the results of these experiments were quickly claimed and advertised by Dr. Caro, of Berlin, as his own. As a matter of fact, the process everywhere claimed by Frank and Caro as their own, with a casual reference to "their friend Mond," was nothing but simply the Mond process as applied to peat and experimented with under Dr. Mond's instructions both at Winnington and Stockton. At neither of these places either Frank or Caro were present or had the slightest connection with the conception or execution of the experiments. (Compare Mr. Emile Mond's letter in *Engineering* of May 31, 1907, p. 708.)

Gissing refers to three special "Mond gas installations now either at work or in course of construction." Of these the one in England is illustrated in the frontispiece of the book, bearing the legend "The first producer plant in the world making regularly sulphate of ammonia and producer gas from wet peat. N. B. Peat may be used containing up to 75 per cent. water." The truth about this plant is the following: The plant was erected in Norfolk for a certain K., who had openly professed the intention to infringe the Woltereck Process patents. He had obtained a demonstration of the Woltereck process under the pretense of wishing to acquire a license, had first dickered with Crossley Bros., Ltd., and finally made a guarantee contract with the Power Gas Corporation.

The plant was erected, run for about a week to fulfill the conditions of the guarantee, and since stands rusting, since K. failed to get the money promised to him for his infringement campaign, by a fraudulent French promoting concern, which generally take their big expert fees in advance without ever finding the capital promised.

The Power Gas Corporation on their part had to go to law to get paid for their work.

The plant in Germany was erected in Sodingen under the auspices of the Deutsche Mondgas Gesellschaft, of which Dr. Caro is the advising oracle.

Here the blessings of the Frank-Caro (beg pardon, Mond process) were to be exhibited to the peat owners of Germany, who were to send in samples (a few tons) of their peat to have it tried free of charge. But when the best results obtained were only 38 kg. of ammonium sulphate, the plant was quickly set to the work it was designed for, i. e., to burn coal, like any ordinary producer plant. Frank and Caro, and particularly the latter, read papers all over Germany to advertise "their" marvellous process and made promises of the miracles they were going to perform in the peat bogs. Of all of these promises none have been kept. A large company was formed and a large bog "purchased" for M. 150,000 (£7,500) near Paderborn, to erect a Frank-Caro plant and to bring the blessings of "cheap electricity" to the inhabitants of the district.

However, the scheme was nipped in time by the Burgomaster and Council of Paderborn, by passing such regulations as to make the execution of the idea impracticable. Whether it was to protect the simple farmers from investing their capital in this bottomless bog scheme or for what other reason is not known for the present. The Burgomaster and Council have anyhow earned the gratitude of their neighbors for saving their money.

The plant for Italy referred to is the only plant of any

size and was not finished at the time of the issue of Gissing's book. The future is, however, not difficult to predict.

It will be quickly found that the recovery of ammonia is unprofitable if a reliable supply of power gas is a necessity and consequently will be quickly dropped, making only producer gas of average quality, the plant for which might have been obtained with a saving of nearly 33 per cent. of the capital invested in the Mond apparatus.

It is necessary at this place to refer to the Dublin power scheme, which was forced through the House of Lords after having been rejected by the committee of the Commons.

The promoters of this scheme always referred to the successful working of the process in other countries. This had sole reference to the plant at Sodingen referred to before.

The weakness of the problem would have caused the collapse of the concern quickly had it gone any further. The cost of the ton of anhydrous peat, to be used with 50 per cent. water, had been estimated by all their experts, none of which was competent to speak on the subject, as two shillings, or at a maximum three shillings per ton. The real cost would have been nearer seven or even eight shillings per ton, or four shillings per ton of peat with 50 per cent. of water, and any expected profits would have been swamped by the difference, and the undertaking would have left another ruin of the misunderstood peat problem. Dr. Mond had also tried to start a similar scheme at Portadown, Ireland, and this plant was referred to as being in the course of erection during the hearing of the Dublin power scheme before the House of Lords committee.

As a matter of fact the Belfast and N. E. Ireland Power Gas Syndicate obtained parliamentary powers in 1904, but on offering to issue a capital of £1,500,000 the public responded only to the tune of £18,807, and there the matter rests at the present.

9. Ziegler's Peat Coking Process at Beuerberg.

The company which had attempted to make a success of this process, the Oberbayerische Kokswerke und Fabrik Chemischer Produkte, went into liquidation after losing more than £50,000, about half of which represents losses on working the process and the rest is due to creditors. The reason for this lamentable result was stated by the chairman at the general meeting of the shareholders at Munich on April 18th last, to be the impossibility to obtain the large quantities of air-dry peat required by the Zeigler coking process at the previously estimated price of cost.

The works had been leased already two years ago to the Torfverwertungs Gesellschaft, G. M. O. H., in Beuerberg,

which has so far not succeeded in overcoming the difficulties. This company has acquired the works now at a very low price but the chances of a financial success are not more favorable for the same than for its predecessor.

The works at Dartmoor, if ever completed, suffer under even greater disadvantages and are certain of failure.

12. Peat Dryers.

It is not necessary to go in detail into this matter. Peat is a substance containing 90 per cent. of water when dug from the bog. The value of the dry material in this mass of matter is too small to allow of any expensive handling or the use of any mechanical apparatus. All inventors underestimate the enormous quantities of matter to be treated and the enormous sizes of the apparatus required to treat a sufficient quantity of peat to bring the fixed charges down sufficiently to make a commercial success even faintly possible. The apparatus of Jones, Lennox, etc., all belong to this category. The same refers to

Peat Drying Ovens

and to the proposed hydro-extractor, which besides, is not capable of removing more than a very small quantity of water.

The only peat industry which so far has established its claim to be called a success is the Peat Moss Litter industry, which is continually growing in a most encouraging manner.

A few words more need be said concerning the chapter of the Appendix concerning "Mond Peat Gas Plant."

The plant referred to there is that already considered under Peat Gas.

That plant was never originally designed or intended for the use of peat, for Sodingen is many miles away from any peat bog, and the plant was erected at the coal mine Mont Cenis for the purpose of producing power gas from the slack or waste coal of the mine. An artificial enthusiasm for the use of peat was created by the lectures of Frank and Caro, but after obtaining 38 kg. per ton of dry peat as the best result, these experiments have been dropped.

The entire chapter is a disguised advertisement for the Power Gas Corporation and the results given on page 158 were obtained at the German plant only as far as the German peat is concerned with 70 pounds, which probably represents an average and is lower than the 38 kg. claimed by Frank.

The results with Italian peat were obtained at Stockton and the results with English peat in Norfolk with the "K" plant already referred to.

The last result is not due to the Mond process, and should regular working be attempted in the future, an action for infringement of other patents will quickly put a stop to the same.

However, there does not appear the slightest likelihood for such a step, as "K" has since again attempted to open negotiations with my company for a license.

An omission in Gissing's after all very interesting book are the works of the Osmon Gesellschaft in Switzerland.

These works operated on an electrical principle, which had a more scientific basis than the now notorious Bessey process of the late Electro-Peat-Coal Company.

However, after losing 1,800,000 francs, this company has now also decided to go into liquidation, since the results obtained on the large scale did not equal in any way those obtained in the laboratory experiments. The company was started in 1905 and was reported to have started the commercial working in September, 1907. Since then nothing has been heard until the present notice of liquidation.

London, June, 1910.

THE POSSIBLE USE OF PEAT FUEL IN ALASKA.

Charles A. Davis.

(From U. S. Geological Survey Bulletin 379.)

More than 12,000,000 tons of peat fuel are prepared and used annually for fuel in the countries of northern Europe, while in the United States and Alaska not 1,000 tons were used in 1908. In Alaska, especially, the high price of coal and other fuel, which has to be taken from a distance to the more remote communities, away from water transportation routes, and the very general occurrence of peat beds, throughout the territory, makes it especially pertinent to consider briefly at this time, the possibility of making use of peat prepared by some of the simpler and cheaper methods in use in Europe.

Peat is partly decomposed vegetable matter, intermediate in character and fuel value between wood and coal. Properly prepared and air-dried, it burns freely and gives off more heat than the best wood, but not so much as bituminous coal of good quality.

It is of widespread occurrence in the moister parts of the earth and in a somewhat fibrous form covers great areas in Alaska, especially in the regions where tree growth is sparse or wanting. In this part of the world it is chiefly formed by the growth of mosses, grass-like plants, water plants, shrubs, and more rarely trees. It develops only in places where the ground is covered by water, is very wet, or is frozen, or where the air is very moist. One of the forms of peat is the brown vegetable matter which covers the great barrens and tundras of the northern part of Alaska.

The chief difficulty in using peat for fuel is that it is always saturated with water, or nearly so, as it is found in the beds, and has to be dried before it can be burned. The drying can be done most cheaply and quickly by exposure to the wind and sun.

In northern Europe peat is used for heating and cooking by the common people, and to a considerable extent also for producing steam, and for making gas for illuminating and power purposes. For these uses it is prepared and sold as (1) cut peat, (2) machine peat, or pressed peat, (3) peat powder, (4) briquetted peat, (5) peat coke or charcoal. Peat gas is also made, either in retorts, with coke and charcoal and various chemical substances as by-products, or in the gas producer, in which the fuel is all converted into a low grade fuel gas. This, called producer gas, may be used for power production, by burning under boilers or, more economically and with greater efficiency, in gas engines of the explosive type. Used in this last way, peat becomes a better fuel than the best grades of bituminous coal are when burned under steam boilers of the ordinary types.

Peat is also used extensively in Europe, and to a less degree in the eastern United States, as stock bedding, for which it is especially adapted; it is also used in the manufacture of chemical fertilizers, as a filler.

As peat is prepared and used for fuel successfully as far north as 66 deg. 39 min. north latitude in Sweden, and in Iceland, where the season is very short and the air very moist, there seems to be no reason why it should not be used in Alaska, in places where other fuel is costly, even if labor is high. In the expectation that the great stores of fuel in the peat bed of Alaska may be used to some extent, the following brief statement of simple ways of preparing the peat for use are given here:

1. **Cut Peat.** Made by cutting out the denser layers of peat beds with spades. The part of the bog to be used is drained if necessary by ditches from 30 to 50 feet apart and one foot wide. The peat is cut from a working trench at right

angles and at the head of the ditches. The cutting is done with sharp, straight, narrow spades in regular courses, which are as wide as the bricks are long and as thick as the length of the spade will permit. The courses are further divided by horizontal cuts which regulate the thickness of the bricks. The size of the bricks is regulated by the readiness with which the peat dries and its density. Small bricks for moist climate and dense peat. In Europe the bricks are cut from a foot to a foot and a half long and from four to six inches wide and thick. The spade used for cutting sometimes has a narrow steel lug welded at right angles to the point, so that two sides of a brick can be cut at once.

As fast as cut the bricks are laid on the surface of the ground near the opening for one or two weeks, until dry enough to handle, when they are stood on end in groups of six or seven, with two others crossed on the top of the pile. At the end of two weeks, more or less, the bricks are turned and piled into larger heaps, laid up crib, or cob fashion. They may be left in these piles until dry, or after a time piled into open stacks, the tops of which should be covered with turf or other covering that will shed water, as the bricks are quite absorbent. The only tools needed for making fuel by this method are sharp, strong spades, or strong, long-bladed knives. Coarse and poorly decomposed peat is not very satisfactory fuel when prepared in this way. In Europe the diggers are paid by the thousand pieces cut and laid out, and in the same way for turning and drying. The cost per ton for the production of the air-dry bricks varies from as low as 53 cents to \$1.75, according to the kind of peat cut, wages paid and the efficiency of the men.

2. Machine Peat; Pressed or Condensed Peat. Coarse, fibrous peat makes a better fuel when it is reduced to a pulp by grinding it with the addition of water, afterwards shaping it into bricks and drying it as in (1). The grinding may be done by throwing the peat into a hole in the bog, mixing with water, and trampling it until the mass is reduced to a thick porridge. Instead of the hole, a box or trough of wood or metal may be used, and the trampling may be done by a horse. Sometimes a shaft, armed with knives, curved screw fashion, is placed lengthwise in the box, and by simple mechanical gearing, is turned by horse power. The peat must be made very wet to be successfully ground in this form of machine, and the trough must be at least 15 feet in length.

After the peat is reduced to a thin, fine pulp, it is removed in barrows and spread out on the cleared and smoother surface of the peat bed, in a layer six to eight inches thick, and

marked off into bricks of the desired size, with a knife or by hand. The bricks soon dry enough to handle, shrinking apart as drying goes on, and may then be treated just as are the cut bricks.

A more modern way of making the product is with a peat machine, which is, in effect, an iron cylinder, with a hopper for receiving the peat at one end and a square nozzle for shaping the peat at the other. Inside the cylinder is a revolving, knife-armed shaft, with the knives fixed to the shaft, and curved to form a screw, as in a brick maker's pug-mill, or in some of the meat grinders so commonly used.

Such machines are made in all sizes, from one requiring a single horse for motive power, and turning out from 3 to 5 tons of peat fuel per day (air-dry weight), to those run by powerful steam engines, and making 50,000 or more bricks per day. The bricks in this kind of machine are formed by the machine as the wet peat is forced from the nozzle.

Machine peat, in whatever way it is prepared, is more compact, more easily handled, does not break up so readily, dries more quickly and thoroughly than cut peat, and is nearly waterproof after the outside is once dry. The cost of making this kind of fuel in Europe varies from 85 cents to \$2.00 per ton, but is generally about \$1.00 per ton.

The other processes of preparing peat for fuel given, are probably not adapted to conditions existing in Alaska, although peat might be used as a source of producer gas in many cases where electric or other power is required, as in mining operations. For use in the gas producer the peat should be machined and partly dried.

The amount of fuel in a given peat deposit may be estimated, roughly, by finding the area and the average depth and multiplying the produce of the two by 200, the number of tons of air-dry fuel which may be made from one acre of peat, one foot in depth.

The time to make peat fuel is in the early part of the spring and summer, from the middle to the last of April until early in September being the season. If frozen while wet, the bricks are very spongy and fall to pieces readily.

If peat is to make good fuel, it must be dried clear through, to the air-dried state; when it is in this condition it burns with a clear, bright, long, nearly smokeless flame and gives out a strong and lasting heat; if it smoulders and requires much draft to keep it afire, it has not been properly dried, for dry peat burns in a common stove with but a very slight draft, and a fire once started in it will not go out until the last bit of the fuel is gone, even if the draft is cut off entirely. Early cutting, thorough drying and some protection from the heavy rains are

the chief secrets of success in making and using this material for fuel.

Peat litter for bedding horses is made by drying and pressing into bales the more fibrous kinds of peat. A bed of this material, six inches thick, will last for months and is greatly superior in springiness and absorbent qualities to the best hay or straw. The moss growing on the top of many of the peat beds, when dried, is a good material for packing all perishable articles of food, being strongly antiseptic, and serves also to protect against freezing and breakage.

A MANITOBA PEAT LITTER PLANT.

By L. B. Lincoln.

(Read at the First Meeting of the Canadian Peat Society.)

While we were tramping over the plains of Manitoba searching for peat for fuel purposes, we struck a gold mine. I do not mean to imply that it was a place where gold could be mined, but it was something I, as a peat man, consider still better. We have found thousands of acres of the best peat moss litter known anywhere in the world, and you can believe me that we have not hesitated long nor have we wasted a minute in purchasing a considerable number of sections of land for the utilization of these peat deposits.

Moss bogs are those in which some species of true moss constitutes the surface cover, and we find on them most frequently an aquatic species of *Hypnum*, wet *Sphagnum*, and *Polytrichum*. Microscopic examination of these mosses proves them rich in empty cells and, when they are carefully dried, they eagerly absorb moisture, gases, etc.

The use to which peat formed from these decayed mosses can be put is manifold, but mostly it is used as a litter for bedding horses and cattle, and this use in late years has increased enormously. H. von Feilitzen, the famous peat man, gives as a simple test for the quality of peat moss the following: "A piece squeezed in the hand will release a certain amount of water; if this water is clear and the residue consists of light colored, undecomposed mosses, it is well suited for the manufacture of moss litter."

The following is an excerpt from an expert's report on this property:

The Julius Shelly Litter Bog.

"The bog is situated in the township 12, range 10, about one mile west of Shelly Station and south of that track of C. P. Ry., in Manitoba, Canada.

The peat of the bog which was examined covers an area of 640 acres and is of very good quality, the best yet found on this continent for manufacturing peat litter, with an average depth of over six feet. Under this litter is a peat bed of five to six feet depth, more or less suitable for fuel.

Six feet depth of litter will give 600 tons of dry material per acre. $640 \times 600 = 384,000$ tons of dry litter and mull.

The bog is nearly all covered with small tamarack and spruce.

The possibilities for draining are very good. The bog can be drained by a ditch running from west to east parallel to the C. P. Railway tracks, ending about one-half mile east of Shelly Station.

The area of 640 acres will allow a yearly output of 10,000 tons of dry material."

A few remarks on the manufacture of moss litter and peat mull along the lines which we expect to follow in the Julius Shelly litter plant may now be in order. The digging of the peat is generally commenced in the fall and the peat is laid out on the surface of the bog and left there to freeze over the winter. This freezing is advantageous as it breaks the fibers, thus facilitating the shredding, making easier the disintegration and resulting in a soft and elastic product. The moss litter bog being partly underlaid by a deposit of peat for fuel, will be in operation summer and winter. When the peat moss is dry it will be brought to the plant, passed through a disintegrating machine where the fibers will be torn. During this process the so-called mull is formed, which is separated from the coarser material by passing it through a sieve and both the mull and the peat are finally pressed into bales. The first disintegrators used are manufactured by Abjorn Anderssen, the most prominent peat machine manufacturer in Sweden, who manufacture peat machinery far superior to that of any other country, especially so far as their export presses are concerned. Later we will build our own machinery. The plans here will show you the outlay of our 160 plant storehouses, which are necessary. The blueprints here will give you an idea of the buildings to be erected on the bog. These buildings contain all the facilities for manufacturing, disintegrating and pressing the peat into bales, as well as for loading the finished product. However, all these drawings will not convey the right idea and I therefore

invite you, one and all, to visit this or any one of our several peat plants in the fall of this year, when I shall be pleased to explain to you more fully the working of each machine. It is proposed to dig a line of ditches about five feet deep with a width of about four feet at the surface and three feet at the bottom, draining the bog to the working trenches. The working trenches run parallel across the whole width of the working area. The peat will be cut in brick-shaped pieces and laid out for drying on the surface of the bog on both sides of the working trench, while the loose pieces remain laid out within the trench to avoid further handling. All the work is piece and contract work. The peat is left during the winter and until sufficiently dry and then piled up and stacked in storehouses right on the bog. From these storehouses a motor car and light trucks carry the material to the plant, which is provided with four export presses. The peat cars bring the material up to the storehouse, where it is dumped into the conveyors which conduct the peat to the disintegrators, from where it is elevated into rotating sieves, the fibers freed from the mull and then pressed into bales about 40x30x20 inches, with an average of about 140 to 150 pounds per bale. The bales are loaded directly on the cars. The entire power is supplied by 65-horsepower gasoline engine, but these will be replaced by a steam engine after the first year's fuel supply is collected from the bog.

Well air-dried moss litter containing about 20 per cent. moisture will absorb moisture better and to a larger extent than any other bedding material. It is a well known fact that although sawdust absorbs from three to five times its own weight of water, and straw will only absorb three to four times its own weight at most, that peat litter will absorb from eight to twenty-four times its own weight. It is further especially adapted to absorb gases like ammonia and carbon dioxide. Moss litter makes the best bedding material also, because it will do away with all foul smelling gases in the stable. The air remains cool and clean, minimizing odors and the infectious diseases of animals. It is very valuable as to the absorption and preservation of nitrogen, as no other bedding material will absorb and retain nitrogen as quickly and to the same extent as this, and the fertilizing value of manure under moss litter is considerably higher than from any other bedding material.

The United States government has made a close investigation of peat moss in the old country and recommends its use as follows: "The advantages of peat litter as compared with other material is very notable. Usage proves that only about half as much moss litter is required as straw and that the price is as a rule about half that of straw, so that there is an

economy of about 75 per cent. in use. The omnibus companies of Paris have found that moss litter costs them four cents per horse per day, as against eight cents for straw.

Professor Dr. Arnold, of Goettingen, who has devoted much attention to peat moss as stable litter, reports to the Royal Veterinary College of Germany as follows:

"In two loose boxes, the one bedded with moss litter, the other with straw, tests were made as to the percentage of ammonia contained in the air. It was found that in the former a trace of ammonia was found after the fiftieth day, while on the first day there was more in the straw stall than on the sixtieth day in the other. The same percentage that was reached in the straw stall on the sixth day was only reached on the 150th day in the moss litter stall."

It is easily understood, therefore, that peat moss litter is used in nearly all military departments for horse bedding, and also in fowl houses, on account of its deodorizing properties and its power of banishing insects. For instance, the great French military pigeon house in Paris, which contains more than fifty thousand pigeons, uses peat moss litter exclusively.

Moss litter is a well known factor in the insulation and in packing industries. It is a poor heat conductor and therefore used for covering of steam pipes, in boilers, stuffed between the walls of log cabins and houses, and is a good cover for garden plants during the winter. Peat mull has been used for about forty years with great success for packing, preserving and transporting perishable meats, fish, eggs, butter, fruit, etc., for the storage of grapes, vegetables, oranges, citrus, etc. It has also proved of great advantage in the shipping of turnips, potatoes, onions and other garden products, by preventing them from sprouting prematurely and keeping them fresh for many days, and even several weeks. Being a bad conductor of heat it is used to cover ice cellars and chambers. A layer of two or three feet in thickness will keep ice under regular conditions for two and even three years. A new use of peat litter has been found in the manufacture of cylindrical wrappers used for the covering of steam and water pipes, coverings, etc. One other use must be remembered, and that is as a filler for mattresses, pillows and covers and for sanitary appliances. It has come under my personal observation that in many first-class sanitariums and hospitals the operation tables are fitted with pillows stuffed with peat moss. The advantage is obvious in every case of a surgical operation, and especially in those cases where the patient should not be disturbed after the operation has been performed. Its ability to absorb blood like any other moisture from eight to twenty-four times of its volume renders it very serviceable.

Peat mull is a very efficient deodorizer and is a fair disinfectant; therefore it is used for closets, and in some European cities its use is made compulsory in places where the sewerage is lacking. Just consider what a God-sent gift this would be for our island neighbor, New Foundland. In locations where cesspools poison the air and the removal of sewerage permeates the damp ground, thus creating the most flourishing field for all kinds of bacteria; all of these bad conditions would be remedied by the use of peat mull, which binds the liquids, prevents the formation of the gases and odors by preventing decomposition or putrefaction at any place. Peat mull is also used to great advantage for packing fruit, vegetables, fish, eggs and meat, and there are concerns in South America who import peat mull in very large quantities for this purpose. Last but not least, I will call your attention to the use of peat as stock food. Experiments have led to a large use of this material mixed with beet and other molasses, for the fattening of animals. It annihilates the purging effect and neutralizes the salt contents of molasses. We know that it is about half cheaper than any other fat producing foodstuff, that it keeps the animal healthy, aids in its digestion and appetite, improves the milk both in quality and quantity, and prevents sicknesses.

A NEW VACUUM PROCESS FOR THE DEWATERING OF PEAT.

G. E. Boberg, Alameda, California.

Before any success can be made in the peat proposition, it is an absolute necessity to know the composition of peat, and to treat it in such a way, that, with the greatest economy possible, we get rid of the water; thereafter to manufacture the substance into marketable products.

We often read about "breaking up the cells," and that peat is a "jelly-like substance," etc., etc., but, before discussing such important matters, we must know the difference between decayed and fermented substances.

Taking the black peat from any deeper layers of a peat bed, the vegetable matters are fermented and no traces of former cell-formation are visible; on the other hand, the top

layers of the same deposit may plainly show decayed remains from plant and peat mosses.

Without going deeper into these subjects, we know that a cubic foot of raw peat weighs about 63 lbs., and, taking the average, contains water to the amount of $87\frac{1}{2}$ per cent.; we have therefore in the cubic foot about 8 pounds substance and 55 pounds water. But of this, water is about 26 per cent., or 14 pounds, chemically combined, or "latent" water and 41 pounds "loose" water. By mechanical means, we can easily squeeze out a large percentage of the "loose" water and as the mechanical arrangements which are required, are not of complicated construction, we suggest that in any economical way we might squeeze out 50 per cent. of the "loose" water, or 20 pounds per cubic foot. Therefore after this is done I have to get rid of 35 pounds water per cubic foot.

Through Dr. M. Ekenberg's method, it is demonstrated that when raw peat is heated to 302° F., under pressure to avoid steam formation, the jelly-like substance, "pectic acid," loses its gelatinous property or breaks up. The German civil engineer, Gutseitz, has demonstrated the same thing by his vacuum method. This consists of heating the raw peat in a vacuum to a temperature of 82° F. when the same reaction is caused. Considering now the temperature 302° F. in the atmosphere and 82° F. in a vacuum, we find that the results obtained are the same with the latter as with the former, and we must explain the reaction occurring in a vacuum by considering that the "pectic acid" breaks up, and not that the cell walls expand and burst. As early as 1867, Mr. Gustafus Weisenborn, of New York, in his letters patent No. 72,537, dated December 24th, advocated the same theories as Ekenberg and Gutseitz, and pointed out that the formation of oil and water vapors must be avoided and that the paraffine bodies and other ingredients in the peat serve as a natural binder; also "that the peat-coke thus treated becomes so hard, it does not break even when thrown on a stone."

Through other experiments, we know that all steam formation must be avoided if we want to produce a hard, dense peat-coke, which can compete with coal in the market.

A liquid freely exposed to the air, at boiling temperature, changes very slowly into vapor, because the atmosphere is an obstacle to the vaporization, but in a vacuum, all heated volatile liquids are instantaneously converted into vapors.

The former statement has been the foundation on which the continually working vacuum process described is constructed, on which was granted a United States patent, December 22nd, 1910. The treatment is as follows:

The raw peat from the undrained bog, or from lakes and

river bottoms, passes first through a mixing machine, where the different layers are mixed and the mass cleaned from impurities. It is then conveyed to a continually revolving press of 3,000 pounds weight, which undoubtedly will squeeze out a large percentage of the "loose" water, or at least 20 pounds of water per cubic foot. The same conveyor transfers the peat from the press and dumps it into a hopper. During the passage through the hopper, the peat is heated up to 85° F. The hopper is constructed with a funnel-shaped termination, which prevents the air from entering the vacuum chamber; the entering peat acts as a continual cork. The main boilers consist of the interior revolving cylinder, on which a worm is fixed to press the mass forward, and of an exterior cylinder which is imbedded in the masonry over a furnace. The upper part of this cylinder is extended to a vacuum chamber, which is connected with a strong vacuum pump. In the bottom, between the threads of the worm, are plowshare-shaped pieces, causing the peat to be continually stirred. The terminations of the cylinders are also funnel-shaped, so that no air can enter into the vacuum chamber, except what the peat might contain. The opinion by several expert civil engineers is that the vacuum obtained will be about 25 mercury inches.

No partition as a filter between the peat and the vacuum chamber is necessary to prevent the suction pipes becoming clogged up, only a wire screen, because there is such a high vacuum that there is no air to support the peat and allow it to become drawn, or lifted up from the worm. The interior cylinder revolves three times a minute and the continually forward moving peat layer is six inches thick, always stirred up, exposing 260 square feet surface three times per minute to the vacuum chamber during the ten minutes' time it takes the mass to be forced through the boiler. The temperature is kept at 82° and 85° F., consequently, over the boiling point in the vacuum, but care must be taken not to overheat the pectic acid, because then it transforms into "hornoid."

The boilers are heated by gas and the heat can be regulated to the standard degrees required, avoiding any overheating and wasting of gases. For each minute there enters 26.2 cubic feet of raw peat into the boilers. This peat is already heated up to 85° F., and, according to the laws of physics governing evaporation, 907 pounds of water would instantly be converted into vapor. This the "loose" water does, but not the "latent" water. The composition of the pectic acid only gradually changes, giving up the water.

At a vacuum temperature of 85° F., it requires 44 pounds of water to create one pound of steam, but one pound of steam at said temperature occupies a space of 27 cubic feet; this

means that 568 cubic feet of steam have to be exhausted every minute, which figures illustrate that a strong vacuum pump immediately exhausts all the steam as fast as it is created, and at the same time keeps the vacuum chamber at a very high vacuum.

Comparing now this, my method, with Ekenberg's, Gutseitz' and several others, and taking it into consideration in comparison with their demonstrated facts, the results must be the same, or it must be supposed that pectic acid breaks up. Comparing Gutseitz' method, the weight of opinion must be on my side, because the process works continuously. I am also exposing a larger surface to reaction in the vacuum and a thinner layer of peat, continually stirred up; also the vacuum is much higher.

The peat forced out from the boilers drops on a conveyer, which transfers it to another continually revolving press of 3,000 pounds weight, by which the larger part of the remaining water is squeezed out, after which there is only about 10 per cent. of moisture left in the mass. The pressed substance is now carried by the same conveyer to the moulding table, where the mass becomes automatically packed in sheet-iron moulds, 4x12x60 inches. These moulds are then loaded on small trucks, with slanting shelves on racks, leaving a sufficient space between each mould. The loaded trucks are shoved into the extracting boiler, which, when filled, is closed perfectly air tight. This extracting boiler is constructed with a self-regulating safety valve, balanced at 400 pounds per square inch. The safety valve is encased on the top of the boiler in a box, which is connected with a gas-pipe, through which the gases push their way to the purifying apparatus when the pressure of the gases in the boiler is more than 400 pounds.

The boiler is movable, running on rails, and by compressed air arrangements can be shoved over a furnace, where the peat is heated up to 572° and 600° F.; after reaching these temperatures, the boiler is immediately moved out to cool off.

What happens in the boiler, each time it is charged with 12 tons of peat, when the mass is exposed to destructive distillation?

It is proved by several plants in operation that the average yield from one ton of air-dried peat, through destructive distillation, is about 35 per cent. of peat coke, 5 per cent. tar, 35 per cent. pyroligneous acid (tar water), and 25 per cent. of gas.

For each charge, 25 per cent. of the peat has been gasified to 210,000 or 240,000 cubic feet of gas, of which the greater part, during the distillation, has left the boiler and is saved in a gas tank. The remaining water in the peat must undoubt-

edly have been vaporized at a temperature of 572° F., and has escaped with the gases through the self-regulating valve.

A great deal of the tarry matter has also vaporized, enriching the gases with hydro-carbons, because at the given temperature, referring to Violetti tables, the larger percentage of tarry matter must have vaporized, leaving a residue of tar in the bottom of the boiler, amounting to about 32 or 35 per cent. of the total amount, together with a considerable amount of pyroligneous acid.

The carbon is left in the molds, together with a small percentage of fusing paraffin and tarry bodies. Through the enormous pressure of the gases, the fusing mass in the molds is pressed together. The paraffin and tarry bodies make a natural binder, when the mass is cooled off. When the boiler is sufficiently cooled off, the remaining gases in the boiler are pumped over to the gas tank and the boiler discharges; the mass in the molds is left on the trucks for a while to properly cool off and harden.

On a large scale, peat-coke was manufactured from air-dried peat for metallurgical purposes at Zeigler's plant in Bavaria; and because the same principles are employed, that is, destructive distillation, with the difference that I am manufacturing a peat of lesser percentage of moisture and utilizing the pressure of the gases, the product must be the same, a hard, dense peat coke.

Although I am employing the pressure of the gases to make the product compact instead of a separate briquetting plant, it must be admitted that at the end of the process, there are no water vapors left in the carbon in the mold; this the experience of others has proved to cause the crumbling of the peat coke.

Without referring to the by-products and their market value, every raw product derived from peat is collected and saved by this method.

Regarding the gases and the heating arrangements, the furnaces are so constructed that, as in a common gas stove, the heat can be regulated and kept at the temperature desired; consequently there is no wasting of the gas. At the same time, it is possible to fire with coke as fuel, when it is necessary. The gases are utilized as fuel and for power at the plant, which is one of the strongest economical points in this invention. After all needed for these purposes is used, there is still a surplus of gases for the market, which can be used for illuminating or power purposes.

Common gas from peat has an illuminating value of about 15 candle power, but as this gas contains 50 or 60 per cent. of nitrogen, the gases from the extracting boiler force themselves

through a bath of sulphuric acid of 58° B., then through a hot shower bath, because hot water absorbs ammonia; thereafter, the gas is treated as ordinary water gas, through a scrubber, and is purified by lime, before entering the gas tank. In this way, I clean the gas from some percentage of nitrogen, enlarging the illuminating value; at the same time I am saving some nitrogen for the manufacture of ammonia sulphate, which nitrogen in other cases is lost.

The capacity of this plant in consideration, is based upon eight pounds of organic substance per cubic foot of raw peat. A continuous run of 360 days and nights would turn out 53,460 tons of dry substance, or 18,709 tons of peat coke; also a considerable amount of ammonia sulphate and gases.

The machinery of such a plant is estimated to cost \$60,000, but with suitable retorts and utensils for recovering the by-products, a complete plant will amount to about \$100,000, not including the cost of a bog.

THE PRODUCTION OF SULPHATE OF AMMONIA.

Charles A. Davis.

One of the most promising methods of utilizing peat that has yet been proposed, is to use it as a fuel in gas-producers, for the generation of power or fuel gas. By thus treating the peat, not only can it be used with a higher percentage of moisture than if used for fuel directly, but, where large installations are required, the combined nitrogen in the peat, which is converted into ammonia by the heat of combustion in the gas producer, may be recovered from the gas and fixed as sulphate of ammonia.

Peat gasified in producers of the Mond type may contain as high as 60 or even 70 per cent. of water, and the greater part of the combined nitrogen contained in it may be converted into sulphate of ammonia.

On account of the recent construction in the United States of a large number of the new type of coke ovens by which the gases given off during coking are utilized and either burned to carry on the operations or condensed into by-products, among which is ammonia, the fear has been expressed that there would be an over-production of this substance. On that account some have expressed the opinion that the by-products gas producer for utilizing peat would be impractical in this country.

The following summary of the conditions existing in the

ammonium sulphate market in England and other countries of Europe for the year 1910 is of interest on account of the facts outlined above and because in England both by-products gas producers and ammonia recovery from coke ovens are no new things, but are well established and are rapidly increasing in numbers. The review appeared in a prominent British trade journal early in the present year. The article also shows that in point of bulk, the fertilizer trade of 1910, by which the larger part of the sulphate of ammonia produced was absorbed, exceeded all records, although the profits were less than expected in some branches.

The production of ammonia, calculated as sulphate of ammonia, including that used in the manufacture of ammonia soda and for other chemical purposes in the United Kingdom during 1910 was 369,000 long tons, an increase of 20,500 tons over 1909. Of this amount 168,000 tons came from gas works, 21,000 tons from iron, 60,000 tons from shale, and 120,000 tons from coke ovens and carbonizing works and from by-product gas producers. Of this total England produced 248,500 tons, Scotland 117,500 tons, and Ireland 3,000 tons.

The price of sulphate of ammonia, f. o. b. Hull, fluctuated during the year, the lowest being \$55.35 per ton, in January, and the highest \$63.26, in October, the average being \$59.16 for the year, or \$4.42 per ton more than the average for 1909.

The shipments of sulphate of ammonia to Germany were not as great as in 1909, as the production in that country exceeded the home demand, the estimated output being 375,000 tons, about 45,000 tons more than in 1909. Belgium and France produced in 1910, 38,000 and 56,000 tons respectively, while the amount credited to Austria was about 100,000 tons. It was estimated that 116,000 tons were produced in the United States, or 10,000 tons more than in 1909. The output of the world is therefore about 1,100,000 long tons, or less than one-half as much as the total production of nitrate of soda, the other chief natural source of nitrogen in the combined form.

The Bureau of Manufactures of the U. S. Department of Commerce and Labor states that the importation of sulphate of ammonia into the United States has greatly increased under the new tariff act which placed it on the free list. The imports for the calendar year 1908 from all countries were 76,475,104 pounds, worth \$1,982,830, but in 1910 they increased to 184,686,534 pounds, worth \$4,668,820.

CONSERVATION OF OUR PEAT RESOURCES.

Francis J. Bulask.

(Prepared for the meeting of the Minnesota Section, A. P. S., Minneapolis. September, 1910.)

It is with considerable trepidation that I stand before you today in answer to the request of Mr. Max Toltz, one of our foremost workers in this part of the country, to make an address on peat. As the keynote of this meeting is conservation, not of natural resources alone, but conservation in their application or use, and as I was given the liberty of choosing my own subject, I decided, after long reflection, to sound a note of warning.

Since listening to our leaders in national conservation, Mr. Gifford Pinchot, Mr. James J. Hill, and others, I became more confirmed in my intention. I do not care to pose as a prophet and say "I told you so," but, as in the tremendous waste of timber, coal and other natural products, the cost of which we are now beginning to realize, so in peat, are there great possibilities of waste, not as in coal or wood, but in the eagerness heretofore displayed by the layman to invest his money before thoroughly familiarizing himself with what he was about.

The conversion of our enormous area of peat land into domestic and industrial fuel, is a problem well worthy of the attention of the best of us. Providence in her all-wise wisdom has seen fit to lay at our very door, here in Minnesota and elsewhere throughout this great and glorious country, peat in sufficient quantity and quality to make those places remote from coal mines and cheap timber, independent of all other sources of fuel. How vast this national resource may be, can but be guessed at, at present. Through the heretofore more or less indifferent investigation, 24,000,000 acres or 36,000 square miles of peat bogs are known to exist in this country and, as Mr. Marius R. Campbell, of the United States Geological Survey, says: "It is estimated that the swamp lands of the United States cover from sixty to one hundred million acres," or from 93,750 to 156,250 square miles. This is larger than the combined area of the states of Minnesota, Wisconsin, New Hampshire and Connecticut; the quantity of fuel in tons is beyond comprehension. Take the 100,000,000 acres and say that but one-half, or fifty millions are available for fuel purposes, and, as the average depth has been determined to be about eight feet, and as one foot in depth covering an acre, contains the equivalent of 150 to 400 tons, we will say 200 tons to be conservative, we, therefore have 50,000,000 multiplied by 8 or 400,000,000 foot acres. This multiplied by 200 tons per

foot acre, gives us the amazing total of eighty billion tons, enough fuel to supply this country for a period of 210 years at its present rate of consumption. To give a somewhat local and more comprehensive instance: The late Professor Harvard of the University of Illinois, during the coal strike of 1906, upon being interviewed remarked, "That if it came to the worst he would burn up his back yard." Upon being asked for an explanation, he said that there was enough peat in and around Chicago to last that city for a hundred years if it had no other fuel to depend on.

Again, a peat bog of one hundred acres eight feet in depth is large enough to supply a 1,000 horsepower per hour electric plant, that is, about 20,400 horsepower hours daily, with all its fuel for a period of eighteen years.

Most of this has been known to some of us for years. To the layman it seems to appear that peat enthusiasts are ahead of the times. It is quite frequently said, "The time will soon come when peat will be in demand," meaning presumably, when our coal or wood resources are depleted or exhausted. These people lose sight of the fact that there are many sections of our country which never had a coal or wood supply and where now the demand for fuel is as great or greater than it will be again, and as great as in any sections of foreign countries where the manufacture of peat fuel is an important industry.

Here is where a note of caution comes in. To the casual investigator, all bogs look alike. To the unexperienced mechanical engineer, it does not seem difficult to design machinery to handle peat. To the unscrupulous promoter, it is a new discovery with which to gold-brick the public. To the casual investigator, I wish to say there are almost as many varieties of peat as there are of timber or coal, suited to quite as many uses, and only those skilled in the art are competent to judge. Here is where a number of most flagrant mistakes have been made. One mistake recalls itself to mind:

After an expenditure of about \$130,000.00 with but indifferent results, a Canadian expert was called in. On looking over the bog for some time, he asked the time of the next train to town, saying he guessed he would try to catch it. They wanted him to look over the machinery, but as he did not seem inclined to, they asked the reason. He replied he had seen enough—the bog was unfit for fuel purposes, which was only too true. I could recount a number of similar instances.

To the mechanical engineer not familiar with peat I might say that his experience in designing machinery for heavy press duty, that his experience in designing steam, direct heat, rotary,

oscillating, vacuum or other style of dryers, that his experience in designing centrifugal and other machinery and various kinds of moisture extractors is of little value and he is presuming on his knowledge of other materials and little or no knowledge of the peculiarities of peat, when he undertakes such work. For instance, would any of you go to a mechanical engineer experienced in designing machinery for drying cement, sand, or evaporating sugar, and commission him to design dryers for you for malt or milk products? So, it has been heretofore with peat with the one excuse that we had no experienced peat engineers in this country. This is no longer true.

To the promoter, I desire to say, that is, the builder of commercial enterprises, not the kind my friend Mr. Whittelsey tells about as follows:

A certain railroad was built in Ohio more or less independent of any grade. After its completion, a party of directors and prospective stock or bond buyers made a trip over the line. At the end of the journey, one of them remarked: "I do not think you have much of a freight-carrying road; your grades are too heavy." Another said he presumed it was not built to carry freight but bonds. For this kind of promoter, the only remedy I can see at present is the publication of his scheme in some recognized organ, possibly in "The Journal of The American Peat Society," and in the light of the splendid work being done by "The American Peat Society," the publicity given its annual meetings, such as the one recently held at Ottawa, Canada, and its section meetings, like that held here, where open discussion is invited, no excuse may be offered for further failure in peat.

The stumbling block most often encountered is the intention to do too much. The fact lost sight of is that it is commercially impractical to put the raw peat through all the forms of apparatus one may have in mind. The schemes to artificially manufacture peat fuel, promoted some years ago by those who should have known, or could easily have learned better, have caused more or less distrust in the minds of the public as to its being at all possible to make a ton of peat fuel in this country at a sufficiently low price to compete with coal. The fact almost always lost sight of is that it takes a certain number of pounds of fuel to evaporate a certain quantity of moisture, and, as experienced in a plant in Ontario, Canada, not enough peat fuel was obtained to provide fuel for the dryer, to say nothing of taking into consideration the fuel necessary to operate the presses, conveyor machinery, etc.

All of the foregoing is intended as a note of warning, as first mentioned, against the fault of taking too much for granted in peat exploitation, of locating on bogs not fit for fuel pur-

poses, of improper or no drainage, of locating the plant in the wrong place, of installing unfit machinery, of employing mechanics unskilled in the art, and again, of taking altogether too much for granted. In fact, as the writer has remarked in several previous addresses, and the statement does not come amiss here, "Americans, in their eagerness to accomplish, took no heed of the difficulties experienced by pioneers, but tried to make the peat conform itself to their inexperienced ideas, instead of benefitting by past endeavors and conforming the machinery to the peculiar needs of the peat. This is the chief reason of a number of the failures recorded."

This country is not as slow-moving as Europe; it accomplishes in a decade more than Europe does in a century, but how great is the expense! In the case of peat, it behooves us to go slow; in fact, our haste heretofore, has caused great waste, not alone in money, but what is now more important, in confidence. Confidence if gained aright will soon give such impetus to the utilization of peat that in a few years, we will outstrip all Continental Europe.

Before concluding my address, I wish to give you who are unfamiliar with its value an idea of some of the possibilities latent in peat. As the production of Portland cement on a large scale supplies more or less our present want of timber, being really a superior building material; as the development of the gas engine enables us to gratify our mania for speed and makes it possible to navigate the air as well as to conserve our coal supply; so in peat, nature has laid before our very doors a fuel superior in many respects and so bountifully distributed, that there is scarcely a section of the country outside of the well mineralized or coal states in which peat can not be found within a radius of fifty miles. Our timber and coal area has always been restricted. Our waterfalls—called in Norway and Sweden, "white coal"—also have their limitations, but peat like all things good, is literally found everywhere. From the Keys of Florida to the frozen zones of Alaska, from Maine to California, in some places called muck, in others tundra, and again in others muskeg, all peat of more or less value for some purpose. Our timber is being cut, iron and other minerals mined, loaded on ships or cars and sent to the coal regions to be made into articles of commerce, then, to quite a large extent, shipped back again, freight being paid both ways, the coal centers being the dominating ones, the centers most thickly populated, the centers of the greatest industrial development and consequent riches.

Now, much of this stands a chance for reversal, as for in-

stance, this state, producing enormous quantities of raw material, will be enabled to build its own industrial centers, as it has both the raw materials and the fuel, and so with many other states. Mr. Toltz, in his address before the First Minnesota Conservation Congress, stated that by the use of Minnesota peat, the cost of producing a better grade of pig iron than now made in Pennsylvania could be decreased about \$6.00 per ton. Some such saving holds good with almost every state in the Union where peat is found. The manufacture of peat into a marketable fuel, sufficiently economical to compete with coal, is a simple process when understood, and to encourage its manufacture the Department of Mines, Canada, under the able direction of Dr. Eugene Haanel, Director of Mines and also President of "The American Peat Society," imported a Swedish plant complete in every detail, and, up to August 1st, about 1,600 tons have been manufactured, at a cost of about \$1.65 the ton, all cost such as depreciation, overhead charges, etc., included. These results were accomplished by the labor of between 14 and 20 men. How much this cost may be cut down by a device lately advertised as making three tons per hour (the same capacity as the Canadian government plant) with the labor of but a man and a boy, remains to be seen. It has been stated, however, that as the machine is automatic in almost all the work required, peat fuel can be made for 75c the ton. What both of the above statements may mean in the development of this industry is not hard to conjecture.

The possibilities open to every town and hamlet, especially in this great northwest country in having the equivalent of a coal mine at or within its corporation limits, in the possibilities of fostering home industries, in owning and operating their own municipal light and power plants, in offering inducements to Eastern capital to manufacture the raw material found almost everywhere into commercial commodities right where found, will cause more or less of a revolution of present methods, will cause an industrial awakening such as occurs but once in a century, and as we are passing through an iron and cement age, I predict that within less than 10 years we shall have to acknowledge the presence of the peat age, which I am confident, just as our coal, timber and oil resources have made their barons, will produce the peat baron, who, like the foregoing, although taking large profits to himself for his labors, will benefit mankind in untold thousands of ways, so let us welcome with hearty accord the embryo peat baron who may now be in our midst.

NEWFOUNDLAND NOTES.

Charles A. Davis.

Peat utilization in Newfoundland seems to have taken a new impetus, stimulated perhaps by the interest of the government and by the need of increased fuel supplies. The question of out of doors drying there will doubtless be a serious one, on account of the humidity of the climate. In fact, through a correspondent residing for many years in the country, we learn that about 40 years ago a company started a peat fuel factory near St. Johns, but eventually had to abandon the enterprise and lost the invested capital because of inability to get the fuel dry enough to make it burn well. Of late years but little use has been made of the very extensive and well nigh inexhaustible peat deposits except for domestic purposes; the peat has been cut by private owners and dried as well as possible for household fuel.

Peat Exhibit.—At the very successful Agricultural and Industrial Exhibition held in St. Johns, during the week beginning Oct. 31, 1910, among the products shown was a peat fuel exhibit which compared favorably with the same material produced in Ireland. The interest in this exhibition, it is reported, was very great, and it is expected that peat fuel production will become an important local industry in the Colony in the near future.

Prospective Peat Fuel Factories in New Foundland.—Consul James S. Benedict, St. Johns, reports as follows:

"Newfoundland has extensive peat areas spread all over the country, and a resolution has been introduced in the house of assembly in regard to its manufacture in the colony.

"The International Carbonizing Co. (Ltd.), of London, England, seeks to obtain Crown lands for the erection of factories to manufacture this product into briquettes or blocks which will do the same work as coal at a much cheaper rate. Not only is the peat to be manufactured into fuel, but into other articles, such as oakum, mats and matting, yarn and ropes, and a fine substitute for leather can be made from it, also material for paper making. Each factory is to cost at least \$125,000 and have an output capacity of 20,000 tons or more annually.

"The company agrees to pay the Government a royalty of 10 cents per dry ton of peat coal briquettes manufactured, and a further royalty of 10 cents per ton for other products which they may manufacture. The company will have the use

of water powers and will be exempt from taxes and duty on their machinery."

The company mentioned is apparently the same one that owns and controls the Ekenberg process and patents. If this is so, the present activity shows that the officers of the company feel at last satisfied that the mechanical difficulties, so long an obstacle to commercial success of Dr. Ekenberg's plans, have been overcome. In this event, some interesting new data will doubtless soon be forthcoming.

Peat Articles.—In the St. Johns Royal Gazette and Newfoundland Advertiser, for September 6th, 1910, and seven later numbers, appeared a very interesting series of unsigned articles by a London, Eng., writer, who preferred to keep his name from the public. The papers were entitled "Peat Development," and were written by a man who is evidently thoroughly posted on the past history and the present status of the peat industry in America, as well as in Europe. The author is a man of strong opinions and is firmly convinced that thoroughly air-dried machine peat in the form of balls is the type of peat fuel most likely to be successfully produced on a commercial basis if not the only one that has any chance of success.

In these articles some of the defects seen by the author in the Anrep machinery in use at the Canadian Government plant at Alfred, Ont., are pointed out and the product and plant are somewhat sharply criticised. This criticism is vigorously answered by the inventor, A. Anrep, Sr., in a later number of the same journal. Mr. Anrep defends his system and machinery and shows that they have attained their present position and reputation only by superior merit. He points out that they have won in many competitions with rivals under the several tests imposed by impartial engineers and have maintained their efficiency in practice.

The effect of such articles will doubtless be to increase the interest in utilizing the peat beds of New Foundland. It is hoped that success will be attained by any who attempt to increase the fuel resources of the Province by exploiting her peat beds in a commercial scale. In the present state of our knowledge there should be no failures.

THE UTILIZATION OF PEAT.

From "The Chemical Trade Journal," March 4, 1911.
No. 1241, Vol. XLVIII, Page 219.

(This article gives the last words of the interesting discussion published in this journal, Vol. IV., No. 1, April 1911, under the title, "To Whom Does the Credit Belong?"—Editor.)

In our issue of January 21, 1911, page 50, we reviewed the correspondence which had appeared in the *Chemiker Zeitung* on the above subject. The following letters have since appeared in our contemporary:

(For the benefit of our readers we may state that Mr. Lymm has given us actual proof of the accuracy of the statements contained in his letter.—Ed. C. T. J.)

Power Gas and Ammonia from Peat.

In the first number of the *Chemiker Zeitung*, page 5, Dr. Caro has taken it upon himself to answer my contribution (*Chemiker Zeitung*, No. 149 of 1910) in a manner which is not at all in accordance with facts. As Dr. Caro has taken advantage of this article to contend that I had written my article in order to fight his patent applications, I herewith refute this contention in the most energetic manner, and beg to add that the patent dispute did not influence my contribution in the least; moreover, the decision in this dispute may very well be left to the Patent Office. I have to add that my patent application of July, 1910 (corresponding to the English patent No. 17,074, July, 1909), only deals with a special method of superheating, whilst Dr. Caro claimed in general the long-known superheating the mixture of steam and air. The question as to the patent for superheating has, however, nothing whatever to do with the question of priority of the whole process, and I will therefore limit myself to clearing up the inaccuracies of Dr. Caro's contentions. Concerning the main point in dispute, I can only confirm that already as far back as July, 1904, Swedish peat containing 40.6 per cent. water was successfully treated in Stockton. The management of the Power Gas Corporation have never received either at that time or since any communication whatever concerning Frank's work. As far as I know, Professor Frank, before 1908 at Sodingen, had no opportunity to obtain any practical experience in this line.

As regards the improvements and alterations in the installation erected by the Power Gas Corporation at Sodingen,

which Dr. Caro claims and speaks about, I would like to say to commence with that all the favorable results obtained there with wet peat (which results were then communicated by Dr. Caro to the Royal Prussian Ministry for Agriculture, and which were announced with great eclat in a lecture by Professor A. Frank), were obtained by us in the installation as erected and worked under our supervision and management, and that these results are in no way to be ascribed to the supposed improvements of Dr. Caro and Dr. Hamens. Furthermore, the alterations which we found it necessary to make in the installation during my supervision at Sodingen were of a purely mechanical nature, and dealt principally with the question dealing with the immense accumulation of ashes of the "washery waste" (50 to 60 per cent.), and the installation was in the first instance erected to work the same; the alterations therefore had nothing whatever to do with an improvement of the results of the experiments made with peat. Later on we made the generator for wet peat somewhat higher, but this alteration proved itself unnecessary. The somewhat hazy statements of Dr. Caro as to the coincidence of the drying and decomposing zones in the generator may be theoretically very interesting, but practically are quite unimportant, according to the views held by every practical, experienced expert. The contention of Dr. Caro that wet peat was used for the first time in Sodingen is contradicted in toto by the experiment made by me, and mentioned above, at Stockton, in July, 1904, with Swedish peat (containing more than 40 per cent. water).

Finally, without going any further into the many erroneous statements of Dr. Caro, I would like to call attention to the fact that in the installation built under my direction at Pontedera, Italy, and with the advice of the managing director, Mr. Emile S. Mond, by the Power Gas Corporation (for the Central Electro Station there, which is in regular operation), Italian peat containing 45 per cent. of water is utilized, without any of Dr. Caro's supposed improvements, with excellent results as to the production of power gas and ammonia.

Dr. Caro contends that the Power Gas Corporation were only enabled to undertake the erection of this installation through the experiments carried on at Sodingen. To disprove this I may mention the fact that the contract for the Pontedera installation, which is now in regular operation, was concluded in the year 1906. Dr. Caro refers to the new prospectuses of the Power Gas Corporation, and contends that these prospectuses contain a statement saying that the attention of the said company has only been drawn to the gasification of peat in the year 1905. If Dr. Caro will give himself the trouble to look at the new prospectuses of the Power Gas Corporation he will

find that 1903 and not 1905 is mentioned. I should not omit to mention that on the occasion of the tenth general meeting of the Power Gas Corporation, held on the 3rd of January, 1910, the president, Sir Alfred Mond, referring to the process in question, said as follows: "I think we can claim to be the first people who have really economically solved that problem."

To sum up: The process of the gasification of wet peat with the recovery of ammonia originates absolutely and entirely from the idea of the late Dr. Ludwig Mond, and has been worked out and perfected by me with the advice of Mr. Emile S. Mond, quite independently of the assistance of Dr. Caro, Dr. Hamers and Professor Frank, and none of these gentlemen have had anything whatever to do with the installations so successfully erected by us in England and Italy. I cannot in the least understand how Professor Dr. Adolf Frank and Dr. Hamers can subscribe to these unreliable statements of Dr. Caro, since whilst I acted as technical manager of the Power Gas Corporation I never had any communication with Professor Frank, never received any information from him, and up to the present date never had the advantage of his personal acquaintance. Dr. Hamers, as I know for a fact, was only engaged by the German Mond Gas Company at the end of the year 1906, or even only 1907, and therefore cannot know anything of the previous happenings in this affair from his own experience. That these two gentlemen subscribe to Dr. Caro's statements does not make by any means his erroneous statements true.

As all statements here made by me can be proved by documentary evidence, I herewith close the discussion.

ARTHUR H. LYMM.

Queen Anne's Chambers, London, S. W.,
January 8, 1911.

The same number of the *Chemiker Zeitung* includes a letter from Dr. H. C. Woltereck, of London, in which he also controverts Dr. Caro's claim for the credit of the successful utilization of peat, and at the same time awards to Rother the credit for the discovery of kalkstickstoff (calcium cyanamide), a process with which Dr. Caro's name is very generally associated.

Dr. Caro replies to the above as follows:

The further published communications of Mr. Lymm on this subject, which appeared in No. 15 of the *Chemiker Zeitung*, convey, as far as material facts are concerned, chiefly repetitions of his representations which appeared in No. 149, of 1910. The only new portion is his statement that the prospectus of the Power Gas Corporation asserts that this company had

already in 1903 turned its attention towards the study of the peat question. This statement is also inaccurate. In the original prospectus of 1908, which lies before me, of the Power Gas Corporation, and which contains an illustration of a medal bestowed in the year 1908, there is to be found on page 10, under the title, "Peat, Power and By-Products," the sentence: "The Power Gas Corporation first turned their attention to the question of utilizing peat for the production of power and the recovery of by-products in 1905." Here is neither the figure 1903 nor 1904.

In opposition to such documentary evidence of Mr. Lymm, all further discussion (which I now for my part close), is superfluous. My representations in No. 1 of the *Chemiker Zeitung* I hold in all particulars correct. Similarly, in No. 15 of the *Chemiker Zeitung*, Herr Woltereck from London proceeds to deny that Herr Professor Frank and myself are the originators of the lime nitrogen (calcium cyanamide) process and the process for the gasification of wet peat with the recovery of by-products.

Herr Woltereck seeks, as the concluding sentence of his letters shows, to make use of this information as a means of propaganda for his process for the supposed combination of atmospheric nitrogen.

I leave it to the expert world to form an opinion on Professor Frank's and my merits regarding this matter, and will not enter into the unqualified remarks of this gentleman.

N. CARO.

The correspondence concludes with the following letters from Mr. Lymm and Dr. Woltereck:

Although I have already closed the discussion, Dr. Caro's final remarks make an explanation on my part necessary. From his remarks it seems that he has sent you a prospectus of the Power Gas Corporation which apparently belonged to a batch that were sent out at that time without correction of the printer's errors. A correct copy of this prospectus was sent to the editor, together with my article of January 18, 1911. It is perhaps in place here to again state expressly that before the start of the Mond Gas Plant, built to my instructions in Sodingen (which was originally erected for utilizing washery waste), Dr. Caro never saw a peat plant of this kind in operation.

ARTHUR H. LYMM.

Dr. Caro has no more succeeded to controvert by his reply the facts as to the honors of invention and working out of the Mond process for peat than Dr. Frank failed to disprove at the time the statement of Dr. F. Rother (*Zeitschrift für An-*

gewande Chemie, 1903, p. 658), concerning the facts of the invention of calcium cyanamide. To the further statement and amplification of Dr. F. Rother (*Ibid.*, p. 753), Dr. Frank did not see fit to reply. In the same way Dr. Caro has the habit to proclaim the close of the discussion when the same becomes disastrous for him. Dr. Caro also appears to confound the rights to an invention with the honors of invention. In that case the rights to the invention belonged by agreement to the Cyanidgesellschaft, and the honors of invention indisputably to Dr. F. Rother. To Drs. Frank and Caro fall merely the part of the honest jobber.

H. C. WOLTERECK.

THE AGRICULTURAL SIDE OF PEAT BOG UTILIZATION.

Charles A. Davis.

It has always been evident to the critical observer that a very considerable percentage of the peat bogs of the world would be quite as valuable or more valuable for agriculture than for other uses, if they could be drained and so changed in character that useful plants could be made to grow on them. In those types of peats where the ash or mineral content is high and the vegetable matter well decomposed, drainage and clearing are often all that is necessary to prepare the land for cultivation. Where, however, the mineral matter is not present except in combination in the plant remains, and where these are poorly decomposed, it is usually found that additional treatment to the drainage and clearing is needed, before the land can be made productive and fertile. The lack of available mineral matter can be supplied by the use of chemical fertilizers, of which potash salts are often found to be the most effective, or by the application of quantities of upland soil or even sand. Lime or marl is often beneficial where the peat is acid, or sour. Heavy applications of barnyard manure have often been reported to give excellent results in hastening the decay of poorly decomposed peat and thus making it better for crops.

In general, it is true that it is difficult to get too much of the water from peat for success in its cultivation, but in several instances which have come under the writer's notice, overdraining seems to be the chief cause of the failure of the crops on peaty soil. The upper layers of the peat were very dry and the supply of moisture for some distance below the surface

was very meager. Where this trouble is experienced the obvious remedy is to prevent the run off of the water by temporary dams placed in the ditches until the water level is raised again to where the fluid is available for the roots of plants. It is best, therefore, not to dig the drainage ditches too deep at the outset and to deepen them from time to time, as experience shows this to be needed.

The great success which has attended the intelligent agricultural development of bog and swamp lands throughout this country is attracting increasing attention, and it will soon be difficult to find such lands in a wild state in accessible places in any of the northern states. One factor must be taken into consideration, however, namely, that the crops which do well on such land are limited in number, and of perishable character, as well as somewhat restricted in market. They are not necessities, hence there is danger of over-production, and even now unprofitable market situations are not uncommon. If many more large swamp areas are to be rapidly brought under cultivation, more kinds of crops should be grown to prevent overstocking the market and frequent loss to the producers.

At the present time some of the most remarkable plans for the reclamation of swamp lands ever undertaken in any country are being carried out in the United States. In Florida, Louisiana, North Carolina, and some of the other southern states, extensive and costly drainage canals are being dug, and some of the states in the region of the Great Lakes are digging ditches as if life depended on getting the water off the land and out of the swamps.

Much of this work is being done by private enterprise, although the more important undertakings are assisted by state governments or are under state supervision. After the land is drained, it is expected that people will settle on it and cultivate it, the canal and land companies getting their profits from the increased value of the land. As a part of the campaign, almost every popular weekly and monthly periodical contains glowing or alluring advertisements of companies promoting the exploitation of drained or drainable swamp lands, and doubtless thousands of inexperienced people in remote cities are buying, at high prices, land they have never seen, and that is still miles away from the nearest drainage outlet, believing that within a short time it can be used as gardens or farms.

In Germany the reclamation and exploitation of swamp and bog lands is conducted on a more careful basis. There, large landholders and capitalists form strong corporations under the direct supervision of the government. The land to be reclaimed is ditched gradually, and experimental farms are

established to determine what crops can be grown on each kind of soil within the drained area, the fertilizers which give the best results, and the other factors needed to make a success of farming the reclaimed lands. Instead of piling the peat dug from the canals on their banks to waste or to slump back into the canals and clog them, it is converted into fuel and used to furnish power for operating the dredges.

If the undertaking is a very large one, like that at the Weismoor near Aurich, in Northwestern Germany, a power station of large size may be developed to use peat that must be excavated during the drainage operations, and later.

From this central, peat-fired electric power station, not only is all of the power obtained necessary to carry on the work on the canals, but enough is also to be generated to supply neighboring towns with current for lighting and for power. A very important addition to the well established and customary uses of electricity is found at this interesting plant in its direct and general application to farming operations on the reclaimed lands. Temporary feed wires are strung to the areas that are being farmed, and by the use of transformers, motors and winding drums mounted on broad-wheeled trucks, electrically operated cables drag gangs of plows, and similar implements, over the fields, thus eliminating the uncertainties of the labor problem.

Of course such installations are costly. For an indefinitely long investment, however, such as would be implied in a plant of this kind established in the midst of a great peat deposit, it would appear to be a wise business policy to include in the drainage plans for some of the great tracts of swamp land now being drained in the United States, the development of a power plant to make use of the peat excavated. This, if not used for fuel, will be wasted, or may even prove an obstacle to the work.

Such a plant might well be developed by units as the work of drainage and reclamation progressed and larger areas came under cultivation and required more power. There is scarcely a doubt that the plant should be built for the generating of electricity and that the power for doing this could be obtained most surely and cheaply by an equipment of gas producers and suitable gas engines. Of gas producers, many types may now be had on the markets for using peat, but of these, for the present at least, the Mond producers, since they are adapted to the use of peat with 60 to 70 per cent. of water, seem most likely to give satisfaction. If the peat is high in nitrogen, or the installation exceeds 1,000 horsepower, the recovery of by-products, especially the valuable ammonia, might be attempted. By such an installation at least one very grave

problem of the drained lands would be solved, the difficulty of getting necessary work done would be greatly lessened and much larger areas of land could thus be cultivated thoroughly. It might be objected that the power required for operating the agricultural lands would only be in use a part of the year, and for the rest of the time the plant would be idle. This could easily be obviated, however, by establishing industries to work up the products of the farms near the plant, or by supplying towns within reach with electric energy by wire. It seems well demonstrated that it is not more difficult to find a market for cheap power than for other commodities.

The increasing scarcity of workmen who are willing to undertake farming, the growing use of machinery of different kinds, including powerful engines for farm work, together with the constantly increasing demand for, and upward tendency of prices of, farm products, make it seem certain that the time is at hand, if not already here, when central stations for furnishing power to farmers will be eagerly welcomed. Why not try one where fuel can be had at low cost and where power must be used for necessary work—in the swamps?

PEAT BOGS OF IRELAND.

Small Success in Utilizing the Deposits Commercially.

Consul H. S. Culver, of Cork, reports, in Daily Consular and Trade Reports, on the difficulties that have been encountered in utilizing more extensively the peat beds of Ireland:

Although peat has been for ages the fuel of the poorer classes in the remote districts of Ireland, by whom it is used in the same manner as wood in open fireplaces, no process has yet been discovered for converting it into a desirable and economical commercial fuel. Many schemes have been tried in Ireland in recent years, and extensive and well-equipped plants have been erected in different parts of the country at enormous expense in an effort to convert the peat into a profitable fuel for manufacturing purposes, but so far all efforts have been disappointing. It was thought at one time by applying pressure to the product in its green and wet state and compressing it into a convenient shape, like briquets, it could be successfully used in the place of coal, but in most cases this process has had to be abandoned. So long as the briquets can be kept free of moisture they remain firmly intact, but the least moisture causes them to disintegrate and crumble to pieces. Numerous

extensive plants are idle in the country waiting for some enterprising company to take hold of them and through some new process or through further experiments convert these bog lands into mines of wealth. Manufacturing paper out of peat was a few years ago thought to be feasible, and a rather good quality of coarse paper was manufactured for a time, but I understand that this industry has also been abandoned.

Lately the Department of Agriculture has been giving serious consideration to several methods for utilizing these lands, and it is to be hoped that they may suggest ways and means for so doing. The Irish Industrial Journal, in commenting upon the subject, says:

"Great possibilities also exist with regard to the agricultural development of the bogs of Ireland. One-seventh of the entire area of the country consists of bog lands—one bog alone, the Bog of Allen, has an area of 240 square miles and extends across the Central Plain, almost from Dublin to the Shannon.

"This immense area is at present a sterile waste, and no serious effort has ever been made to bring it under cultivation. The success which has attended the efforts to reclaim bog lands in Bavaria, Austria, and other Continental countries, where they have been made to produce remunerative crops of potatoes, roots, vegetables, etc., would indicate that the reclamation of our bogs is not by any means an insuperable difficulty. Reafforesting the bog lands is another possible way in which they may be turned to good account.

"Attempts at planting them have been made in the past, but unfortunately with little success. Yet it is certain that peat, under specific conditions, does not form an unfavorable soil for forest growth. In support of this statement a succession of several buried forests have been found in the bogs of Schleswig-Holstein, Norway, etc., and in Irish bogs buried forests of oak with roots penetrating into the mineral subsoil, and higher up in the peat layers dead forests of deal are to be seen. These trees must have flourished under climatic conditions not so very different from those that prevail at the present day. It should be well worthy of scientific investigation whether by any treatment it be possible to make the peat lands of Ireland once more suitable for forestal purposes."

PEAT PRODUCER GAS FOR GAS ENGINES.

The use of peat for producing gas to drive gas engines was made the subject of extensive study by the author. The very fact that the exploitation of peat bogs will never demand as expensive machinery and equipment as coal, for example,

would be an argument in favor of using peat to produce gas, not only for gas engines, but for industrial use. The tests were made with peat having 40 per cent. of water and on double-acting gas engines with cylinders of 580 mm., cylinder running at 150 r. p. m. The peat, on analysis, gave: water, 40 per cent.; ashes, 6.74; carbon, 31.79; hydrogen, 3.02; sulphur, 0.87; oxygen, 17.45; nitrogen, 0.13. The calorific value of this peat was 2,550 heat units. During the test the average load on the engine was 77.5 k. w., and as the test lasted six and a quarter hours, the total was 485 k. w. The total amount of peat used was 980 kg., making a specific amount of 2.02 kg. k. w. hour. The power was transmitted by rope drive to a dynamo. Figuring the effective degree of rope drive at 95 per cent. and that of the dynamo at 88 per cent., we get a total of 126.5 h. p. The total work done was 790 h. p., and therefore the specific amount of peat with 40 per cent. water was 1.24 kg. h. p. hour. But in reality only 0.744 were used. This was only for a two-thirds load and with a full load the peat consumption would only be 0.572 kg. This makes 2,435 heat units for the peat. If we compare this result with a similar test made with Mond gas, we find the peat yielded an efficiency factor of 86.5 per cent., whereas the Mond gas gave only 15.5 per cent. under the same conditions. A second eight-hour test was taken with peat having 33.5 per cent. water, under identical conditions. The average efficiency was in this case 123.4 heat units and the total work was 990 k. w. hour; 1,467 kg. peat were used, giving 0.598 kg. per h. p. hour. A third test was made with the same gas engine on two-thirds load, at 109.2 k. w. The efficiency of the gas engine was 182.84 h. p., running at 154 r. p. m. In eight hours 1,696 kg. of peat were gasified, making 1.94 kg. hour and 0.98 kg. per indicated h. p. hour; 1.16 kg. per effective h. p. hour. The peat on analysis gave: water, 45.54 per cent.; ashes, 2.51; combustible substance, 5.95; solid carbon, 16.30; volatile matter, 35.56 per cent.; carbon, 29.96; hydrogen, 3.06; sulphur, 0.09; oxygen, 19.56; nitrogen, 0.18. Calorific value, 2,363 heat units. In this test, the gas engine used 2,735 h. u. per effective h. p. hour. If we figure the total demand of a gas engine running on a full load as 2,100 h. p., and at two-thirds load at 2,520 h. p., the efficiency of the gas producer was found to be $2,520/2,735$, equal to 92 per cent. These examples show in a small way of what value peat is in the gas engine operation and that 1 kg. anthracite coal is equivalent to 1 kg peat, with the advantage of cheapness and greater economy favoring the peat.—Carl Heinz-Zeit, Verein deutscher Ingenieure, March 11, 1911. (Progressive Age, May 1, 1911, p. 380.)

THE UTILIZATION OF PEAT IN GERMANY.

Consul William C. Teichmann, Stettin, Germany, in Daily Consular Reports, writes as follows:

Efforts are being made in Germany to improve the cultivation of marshes and moorlands. The success attained in this direction in the Netherlands has attracted attention in this country, particularly since Dutch gardeners and truck farmers have predicted that, were the marsh lands in Prussia cultivated like those of Holland, the German canned fruit industry would conquer the world.

The German marsh and moorlands cover an area exceeding 2,000,000 hectares (4,942,000 acres). The largest sections, by far, are in Prussia, principally in the Provinces of Hanover and Schleswig-Holstein, and also in Pomerania, Bandenburg, Posen, and Ost-Pruessen. The best quality of peat from German soil, so-called "air-dry" peat, contains about 45 per cent. of carbon, 1.5 per cent. of hydrogen, 28.5 per cent. of chemically bound water, 25 percent. of hygroscopic water, and small percentages of nitrogen.

The annual production of peat in the Empire approximates 10,000,000 metric tons (11,023,120 avoirdupois tons). Regarding the heating qualities of the best peat, it has been established that the average peat is equal to dry beech wood at similar weight and equal to coal of half the weight. There is a vast difference, however, in heating power between the different grades of peat at equal weights. If the ash exceeds 25 per cent., the peat is deemed not adapted for fuel purposes. The percentage of ash in peat can vary from one-half of one per cent. to 50 per cent., or more.

The industrial utilization of peat for lighting purposes has been attempted for many years in Germany, but as yet there has been no satisfactory solution of the problem of how to produce power gas from peat more cheaply than from coal.

In conjunction therewith, the generation of ammonia and of electricity has been given much attention in scientific quarters, and at the last annual convention of German scientists and physicians this problem was discussed as a result of new views and investigations by Dr. Caro, of Berlin. In collaboration with Professor Frank, of Charlottenburg, Dr. Caro discovered a method for the economic utilization of peat, which he claims avoids former mistakes and which he describes as follows: The generator consists of shaftlike ovens where the combustion of the peat is accomplished in a way admitting limited quantities of air. Dry peat in pieces can be treated in this way and produces a gas strongly impregnated with tar fumes.

which gas, after purification from tar, will furnish a useful heating and power gas. The inventor found that if the gasification process is properly conducted, peat containing as much as 60 per cent. of water and even sludgy peat, could be used. Peat having a percentage of water above 60 per cent. could be dried down to this figure by storage in the open air.

This process, Dr. Caro asserts, permits the manufacture of good heating gas during the entire year, and he claims that it can be used in connection with the generation of electricity. In view of the absence of constant water power in Germany, he thinks that the invention will cheapen the cost of generating current. Another result of the discovery is the extraction of nitrogen by this process, 85 per cent. of this element contained in the peat being recovered therefrom. This nitrogen can be converted into ammonia by the introduction of steam. The method admits of the production of ammonium sulphate, and thus furnishes agriculture with a valuable fertilizer.

An example of the profits realized in swamp improvement is shown by the fact that of 6,178 acres of moorland purchased by a private company for \$29,750, 2,471 acres have already been sold for \$38,080.

The purely agricultural utilization of swamp and moorland in Germany is being pushed with vigor by the Verein zur Foerderung der Moorkultur, which has 1,124 members and 300 model stations at which experiments are conducted on a scientific basis. The Prussian minister for agriculture is now engaged in preparing a comprehensive law giving the Government extensive power to stimulate by direct financial assistance, as well as by the use of all available governmental facilities in the broadest application, all efforts for the cultivation of the German marshes and moors, although 90 per cent. of the Prussian high moorlands are in private hands.

THE PRODUCTION OF PEAT IN FRANCE IN 1909.

We see very little relative to the production or use of peat in France in accounts of European exploitation of this resource, hence the following translation of an official report on the subject is of interest and value:

The production of peat continues to diminish each year; in 1909 it was 78,600 (metric) tons (86,656 short tons), as compared with 80,000 metric tons (88,200 short tons) the year preceding.

The peat bogs exploited in 1909 were distributed among 147 communal and 341 private holdings, these last comprising

2,462 distinct exploitations. The communal peat deposits furnished 56,337 short tons, instead of 54,994, as in 1908, and the private peat bogs 30,318 short tons, as compared with 33,318 the year before.

The Department of the Somme, which is the principal region of exploitation of this combustible, produced 21,720 short tons, which is 16,537 tons less than in 1908. The Loire-Inferieure furnished 17,420 short tons; L'Aisne, 12,127 short tons; le Doubs, 8,490; l'Isre, 5,950; le Pas-de-Calais, 5,512; l'Oise, 3,528, etc.

The price of peat, always variable according to the location of the peat deposits and the quality of the product, was in the lowest case 12.22 francs (\$2.44), which was a rise of 33 centimes (\$.066), above the lowest price of the year before. The total value of the year's output was 960,000 francs (\$192,000), which was 11,000 francs (\$2,200) more than in 1908.

C. A. D.

ELECTRICITY ON ONTARIO FARMS.

In view of the fact that there is almost certainly to be closer trade relations between Canada and the United States, because of the pending reciprocity treaty, producers of raw materials generally, and especially farmers, in this country, will be interested in anything that will tend to increase production or decrease its costs. They will, therefore, find cause for reflection in the statement recently made by United States Consul Johnson, located at Kingston, Ont., as follows: "The hydro-electric power commission, which is now working out to success its plans for supplying power to towns and cities, has been awarded contracts for the erection of a transformer station in connection with the Agricultural College at Guelph, in order that this institution may have the benefit of hydro-electric power, which is expected to conduce to both efficiency and economy; but still more important are the plans of the commission for placing cheap power at the disposal of the individual farm in the electric zone.

It is too soon to say how far electricity may be economically and successfully applied to the problems of the Ontario farm, but the extent to which invention has already revolutionized rural life gives a basis for the most enthusiastic expectations."

If, as has been asserted from time to time, the generation of electric energy from peat by means of the by-products gas producers, cost less for installation and for production per kilowatt hour, than by water power, for the same amount of

power delivered, there seems to be no reason why the peat bogs of the United States should not become centers of distribution of power for use on farms as well as in cities. As pointed out in another place, Germany has already in operation at least one great power station on a peat bog and has applied the power to farming.

C. A. D.

Reclaiming the Low Lands Near Stockton, California.—

The delta of the San Jonaquin river, near Stockton, Cal., contains about 150,000 acres of peat which is being cut into enormous tracts ranging from 2,000 to 12,000 acres for use in agriculture. Throughout the entire delta this peat formation rests on a clay base and varies from 1 foot to 16 feet in depth. The peat when perfectly dry weighs about 9 pounds per cubic foot. The lands in their natural state are about 3 feet above low tide of the adjacent end of San Francisco Bay, and about 1 foot below high tide. In the early history of the reclamation work, it was considered that the lands were so near high tide mark that levees from 3 to 4 feet high would be ample for their complete reclamation. Such levees were built over practically the entire area by Chinese laborers who handled the material with wheelbarrows. It was not then understood that as the levee material was piled on the lightly formed peat, the latter would settle as fast as new material was added. Neither was it foreseen that when the land inside the diked areas dried out and the tules were burned off, the peat would settle and make the pressure against the levees much greater. As a result of this oversight, all the earlier attempts at reclaiming these lands were failures, although large sums were spent in this way.

AMERICAN PEAT SOCIETY.

Bulletin of the Executive Committee.

Perth Amboy, N. J., July 10, 1911.

Since October, 1910, this Committee has held seven meetings, devoting its energy to methods to increase the membership, create industrial and agricultural interest, make the Society more and more useful to its members, arrange papers for meetings, etc. The Committee can announce that its efforts have borne fruit. It is at present the intention to circulate a bulletin to all our members after each meeting, stating what is taking place.

The following is a partial list of papers and speakers expected at our annual meeting at Kalamazoo, Mich., Sept. 21, 22 and 23:

Prof. Davis, Dr. McKenna and Mr. Bordollo compose the Committee on Papers, and all papers intended for the annual meeting should be in the hands of Mr. J. Bordollo, Kingsbridge, New York City, not later than Aug. 15th.

B. F. Haanel, Peat Gas-Producer Tests of the Department of Mines, Canada.

Prof. R. H. Fernald, Latest Development in Gas Producers.

Dr. N. Caro, (paper to be announced later).

Bulask & Garnett, Peat Dredging.

Dr. J. MacWilliam, Powdered Peat for Power Production.

L. B. Lincoln, Peat Excavators.

Paul H. Todd, Peat in Agriculture.

Prof. A. J. Patten, Peat Bogs in Michigan from Agricultural Point of View.

Prof. H. D. Haskins, Fertilizing Qualities in Peat.

Max Toltz, Peat Aspects in the Northwest.

E. V. Moore, Recent Developments in Peat Machinery.

J. N. Hoff, Some Peat Deposits in Florida.

Dr. T. A. Mighill, Recent Developments of Peat as a Power Factor.

Dr. J. H. Pratt, Drainage of Peat Deposits.

T. S. Gladding, Agricultural Possibilities of Peat.

A. Anrep, Jr., The Canadian Government Peat Fuel Plant.

Fertile Clay & Peat Co., Value of Peat as Fuel for Brick Making.

Max Klar, Peat By-Products.

Power Gas Corporation (Ltd.) of England expects to present a paper. The Mond Gas Producer for Peat.

G. Pinchot is expected to be present and deliver an address.

Members desiring to read papers at the Annual Meeting are requested to send titles at once to the Secretary, Mr. Bordollo.

Members should draw the attention of their friends interested in peat to the date of the Annual Meeting and ask them to attend, as all interested are invited. If members will send names of those interested to the Secretary, Mr. Bordollo, a copy of the program of the Annual Meeting will be sent them shortly before the meeting takes place.

(Signed) EXECUTIVE COMMITTEE.

Herbert Philipp, Sec'y.

AMERICAN PEAT SOCIETY.

Bulletin of the Secretary.

New York, August, 1911.

Dear Sir:—

A cordial invitation is extended to you to attend the fifth annual meeting of the **American Peat Society**, to be held at Kalamazoo, Michigan, September 21, 22 and 23, 1911.

Government Plants. At Kalamazoo you can learn all about the various efforts made for the utilization of the millions of acres of peat swamps in the United States and Canada. Both governments take a strong interest in the problems involved. In Canada the government has a peat fuel plant in operation at Alfred on 300 acres of peat bog and a peat gas producer at Ottawa. Canadian officials will report on the commercial results of these plants, and together with the U. S. Government peat expert will give practical advice as to how to establish commercial plants with small risk.

Kalamazoo. There will be shown at Kalamazoo a peat fuel plant in operation. In agricultural lines Kalamazoo will present an object lesson in the cultivation of peat bogs, viz.: celery, onions, peppermint and other crops suited to these soils.

Drainage. The drainage of swamp lands should be national in scope, and carried on by the government, just like the great irrigation works of the arid West. Under the direction of Dr. Joseph Hyde Pratt, past president of the American Peat Society, over 300,000 acres of swamps in North Carolina are in process of reclamation, and plans are arranged for the draining of 450,000 more. Proper drainage of peat bogs for industrial enterprises as well as for agriculture is of the highest importance in successful utilization.

Peat as Fuel. In the New England and Northwestern States and Canada coal is high in price, but peat bogs are abundant, and furnish the cheapest and best fuel available. Being free from sulphur it is excellent for metallurgical purposes, for brick making and domestic use. Come to Kalamazoo and hear all about it.

Peat Gas and Peat Powder as a Power Factor, and Peat By-Products. Several plants have been in operation for some years, and they will be fully described and discussed at Kalamazoo.

Various Other Products. Peat filler, peat litter for stable

bedding, peat mull as packing and disinfectant, peat moss for use of florists and others. You will be able to learn about all these.

Advanced Sheets. A few advanced sheets of those papers received in August will be issued for the Engineering Press and those wishing to take part in the discussions.

Transactions of the Fourth Annual Meeting, 170 pages, will be mailed on receipt of 25 cents per copy.

Headquarters will be at the American House, Kalamazoo. Rates for rooms from \$2 up. For particulars apply to chairman of the Reception Committee, Mr. Carl Kleinstueck, Saxonia Farm, Kalamazoo.

Important. To enable the Committee to estimate the probable number of guests, please notify the undersigned.

Kindly favor with an early reply.

Faithfully yours,

JULIUS BORDOLLO, Secretary.

Kingsbridge, New York City.

A number of surprises await those attending the meeting at Kalamazoo. Among others will be a daily moving picture exhibit of a complete peat fuel plant in operation. When and where the same can be seen will be made public at one of the early meetings of the Society. Later on it is proposed to show this picture to whoever is interested, saving the expense of a trip to the bog.

"THE CONSTITUTION OF THE WESTERN GREAT LAKES SECTION

Will take place during the Fifth Annual Meeting of the American Peat Society at Kalamazoo, Michigan. Members of this Society residing or having peat property within the States of Illinois, Iowa and Wisconsin will please call on Mr. L. B. Lincoln, Vice President for the mentioned District, at the American Hotel, Kalamazoo, Mich., on Sept. 21st."

Journal of the American Peat Society

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Herbert Philipp, Perth Amboy, N. J.

Dr. Joseph Hyde Pratt, Chapel Hill, N. C.

EXECUTIVE COMMITTEE.

Dr. Chas. F. McKenna, Chairman; Julius Bordollo, John N. Hoff,
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sent to the Editor, Charles A. Davis, 1733 Columbia Road, Washington,
D. C., or to one of the Associate Editors.

EDITORIAL NOTES.

Contributions. The editor is under great obligations to those members of the American Peat Society who have contributed papers and notes for this Journal during the past year. The supply, however, has been entirely inadequate, and if this number is looked over carefully it will be seen that the editor has had to provide a considerable percentage of the subject matter himself, which is always an undesirable state of affairs. No apologies are made for the irregular appearance of the last two numbers as the composition of their contents has required time and energy which could only be given as opportunities offered in the course of fulfilling other duties.

The Kalamazoo Meeting. In another place are published notices of the preparations being made by the officers of this Society for the Fifth Annual Meeting at Kalamazoo, Mich., Sept. 21-23, 1911, and also a letter from Mr. Carl Kleinsteuck,

chairman of the local Committee of Arrangements. Mr. Kleinstueck and the officers are doing their full duty, and then some, to make the success of the meeting complete, but it does not rest with them. The only way in which success can be had is by the individual work of the members of the Society to make this meeting the very best that has yet been held. Are you going to do this work?

Mr. Robert Ranson, of St. Augustine, Fla., is now in England, and expects to return to America in time to attend the Annual Meeting. Before he comes back he plans to make visits to the peat power plants of the Mond type in Germany and Italy, and thoroughly examine them. It is hoped that Mr. Ranson will present a paper based on this European experience at Kalamazoo.

Dr. N. Caro, of Berlin, Germany, was recently in New York City on a hurried business trip. It is not known whether this visit was in the interests of the phases of peat utilization with which the names of Frank and Caro are so intimately connected, or not, as this is but one of the phases of activity of these well-known industrial chemists. The plan of utilizing peat for the production of producer gas and recovering ammonia seems to be receiving increasing attention abroad, and the erection of a plant of this sort in the United States is among the possibilities which may reasonably be expected in the near future.

The German Peat Society. (Verein zur Förderung der Moorkultur im Deutschen Reiche). The 29th Annual Meeting of the German Peat Society was held at Berlin, February 21 and 22, 1911. There are now 1,124 members, of which five are from America and 85 from other countries besides Germany. The interest taken in Germany in such meetings is shown by the fact that the Ministers of Agriculture, the Interior, the Treasury, and of Public Works were present at the sessions of this Society, as well as representatives of Austria, Norway and Russia.

The total income of the Society for the past year was \$15,000, of which the Government contributed \$11,000; \$1,500 was received from dues and \$600 from advertisements. The total expenditures were \$13,000, of which \$2,400 was for administrative expenses; \$2,200 the cost of the official organ of the Society, "Mitteilungen," \$2,500 for traveling and the examination of bogs, and \$6,000 for demonstration stations.

The whole report shows such a healthy and progressive condition that it is hoped that the members of our own Society

will be stimulated to action by the success of our sister society and that they will assist their officers in doubling the membership before the Kalamazoo meeting.

Papers were read at the meeting of the German Society on Importance of Moorsand Cultivation; Peat Bogs for Garden Crops; A modern Peat Plant on a Large Scale; The Peat Industry of Bavaria; Government Colonization and Peat Industries. Many of the papers were illustrated with lantern slides. The papers and discussions are published in full in the "Mitteilungen" of the Society. For particulars address the General Secretary, Max Jablonski, Berlin S. W. 11, Dessauer Str. 6, Germany. If more of those interested in peat and peat bog development in the United States followed the work of this excellent Society more closely, we should learn of fewer mistakes made in this country.

Bog Utilization in Norway. The work of Det Norske Myrselskab, the Norwegian organization corresponding in its aims to the American Peat Society, was recently summarized in "The Daily Consular and Trade Reports," of the Bureau of Manufactures. According to this report the Society's engineer and his assistant are kept constantly busy and many requests for surveys cannot be granted.

The Society has investigated 750 marshes and delivered 158 lectures throughout the country. In order to introduce improvements in the utilization and cultivation of bogs and in making peat fuel and moss litter, an experiment station has been established at Maeresmyren, Sparbu, with branches scattered all over the kingdom. Peat machines have been examined and improved, experiments are being made, with new methods of firing peat, and a course of instruction, treating on the preparation and manufacture of peat and litter, where young men are trained to take charge of this kind of work, is being pursued by representatives from every district.

Since the organization of the Society in 1902, the number of litter factories has increased from 53 to 270, and the number of peat fuel plants has more than doubled. A recent report from the forester's office shows that 360,000 cubic meters of peat have been manufactured and used as fuel during the last twenty-five years in one of the smaller districts of Norway. This not only represents the commercial value of the material used, which is estimated at \$335,000, but it means great economy in cutting of timber.

The fact that Maeresmyren (an extensive marsh) is now being reclaimed by the aid of convict labor, and that the owners of other marshy tracts in Norway have decided to begin reclamation, is largely due to the activity of the Norske Myr-

selskab. The Society makes every effort to encourage private initiative, and its engineer, during 1907-8, superintended the reclamation of 350 acres of smaller bogs in addition to those already mentioned.

Canadian Peat Production. So far as received by this Journal, the production of peat fuel in Canada during the year 1910 amounted to 1,692 tons, valued at \$3,019. This quantity from the figures given out seems to be exclusive of that made at the demonstration plant of the Department of Mines at Alfred, which amounted to nearly as much more, so that the total production was over 3,200 tons.

Peat Cargo Lost. A Florida correspondent not long ago reported that a ship that was wrecked on the coast of Florida during the winter, disclosed as a part of its cargo 1,000 tons of peat, shipped from Cardiff, Wales, to Vera Cruz, Mexico.

The Use of Peat as Fuel on Swedish Railways has been discontinued, according to the report of Consul General Winslow, of Stockholm. As there is no coal of any consequence in Sweden, but a large supply of peat, it was thought that the substitution of peat as fuel would result in great saving to the kingdom. The experiment was tried on the Swedish railways, and no fewer than 140 trial trips were made, with the result that the engineers estimated a loss of \$1.84 per ton of peat as compared with coal—a ton of coal containing, according to the report, as much heating power as 1.64 tons of prepared peat. The directors of the state railways have, therefore, discontinued the use of peat as a substitute for coal. They remark that many other countries have made similar experiments and the same results have been obtained, thus causing a return to coal for the generation of steam.

(No report was made as to the form of grates and fire boxes of the locomotives in which these tests were conducted, but it is manifest that if these were of the same type as were used for coal, the tests were unfair. It would be entirely out of reason to expect peat to give results that would be satisfactory in furnaces built for burning the high grade English coal such as is used in Sweden. While it is unquestionably true that coal is a better fuel for locomotives than peat, it is also true that the peat would make a much better showing as steam fuel in a furnace adapted to its peculiarities than in one built to give satisfactory results with coal.—Editor.)

Peat Moss from Holland. The value of the peat moss litter exported to the United States from the port of Rotter-

dam, Holland, during the year 1910 was \$47,485. This was \$2,278 less than for the year 1909, when the total value of the shipments of this product to the United States was \$50,763.

The most surprising aspect of the entire peat business in the United States is that so few people seem to take the slightest interest in the manufacture and sale of peat litter for use in stables. The only firm attempting to make this product, the John E. Baker Moss Co., of Garrett, Ind., built up an excellent business in a region where the material was entirely unknown, until introduced by these producers. Even this firm, after several years, last season yielded to the temptation of the paper-makers and sold their plant and bog to the Garrett Peat Paper Company, and once more all peat moss litter used in the United States is imported.

Exhibitions of Peat Products. A most attractive way to push into notice the use of peat for fuel, is to give exhibitions of peat products where the mass of the people, the common people, can see them. If those who are making peat fuel even in a purely experimental way, would make up a supply during the summer and take it to the county and state fairs in their vicinity during the fall, they would find it an unfailing attraction. If some of the fuel could be burned during the exhibition, so much the better, for the people need information, and there is no better way to give it to them than this. In the same way stable litter, fertilizer products and peat powder or mull could be made the basis for practical and interesting exhibitions.

The few times this plan has been tried in this country, the interest aroused has been great and it is hoped that the Society will have a practical exhibition at Kalamazoo, at the Annual Meeting. Let every one who has good specimens take hold and send them to Mr. Carl Kleinsteuck, so that this part of the meeting will be a success.

Wood Distillation in the United States During 1909. As the question sometimes arises as to whether there would be a market for the by-products which could be derived from peat coking operations on a considerable scale, it will be of interest to examine the following statistics relative to the destructive distillation of wood and the chemical by-products made in 1909.

There were 147 wood distilling plants in operation during the year; of these 116 plants consumed 1,150,000 cords of hard wood, valued at \$3,818,000, while 31 plants used 116,000 cords of soft wood worth \$242,000. The value of the hard wood distillation products totaled \$7,642,000, of which more than \$7,500,-

000 represented charcoal, crude wood alcohol and gray acetate of lime. Minor products were brown acetate of lime, iron, acetate and oils. The value of the soft wood distillation products amounted to \$687,000, of which \$453,000 represents turpentine and charcoal. The soft woods also yielded 1,365,000 gallons of tar valued at \$105,000, and 323,000 gallons of oil valued at \$70,000 as well as \$59,000 worth of miscellaneous products.

Stock Food Possibilities. An item of interest to those who see possibilities in the use of peat in some form, as an absorbent and body for stock food, is culled from Daily Consular Reports, recently. Vice Consul John W. Thomas, from Manchester, England, reports the arrival at that city of a cargo of thick liquid sugar refuse from Cienfuegos, Cuba, to be used by a local firm for the manufacture, in conjunction with hops and other ingredients, of cattle feed and other specialties used in the rearing of farm stock. The shipment was pumped from the vessel into tank cars in which it was conveyed to the manufacturer's works. This liquid sugar differs from molasses in so much as the non-crystalized cane sugar retains such valuable materials as pectin, glucose, lime and gums, which are not found in the ordinary white sugar used for domestic purposes.

Peat Powder versus Coal as Fuel. A number of practical tests undertaken at various places in Sweden distinctly point to the fact that peat powder can successfully compete with coal as boiler fuel. At the Sahlstrom factory in Jönköping, according to Engineering, several thousand tons of peat powder have been used as boiler fuel with the result that one ton of peat powder, made from good peat, if properly utilized, has been found to be equal to one ton of good English coal, fired in the usual way under similar boilers.

Powder made from second quality of peat, naturally, is a less efficient fuel, but still is a perfectly efficient one, which is a point of considerable importance. Experience has also shown that it does not pay to carry the drying and refining process too far. The most satisfactory and paying results are obtained by reducing the per cent. of water to only about 15 per cent. At this percentage, the powder will cost less to prepare and only slightly less efficient than if the moisture content were reduced to 12 per cent. or even to 10 per cent. Lieutenant Ekelund, who has for years carried on experiments in making and burning powdered peat, sums up the results of his experience in the use of powder made from average peat with 15 per cent. of water as follows: "One and two-tenths ton of peat powder equals for boiler fuel one ton of the best coal and for peat pow-

der made from good peat, the value is about equal to that of the best coal, ton for ton, under working conditions."

Peat powder can be produced at 8 kroner (\$2.16) per ton, inclusive of interest and sinking fund, while coal delivered to the railway in Swedish ports at present costs 14.75 kroner (\$3.88) per ton.

The Swedish Association of boiler owners has begun experimental tests with the new fuel and the leading state peat engineer also reports very favorably on the Ekelund method of making and using peat powder, unhesitatingly stating that, in his opinion, peat powder as boiler fuel excludes all competition on the part of coal (in Sweden). Peat powder is also by way of experiment, being used for electric ore smelting, and very favorable opinions as to its value for this use have been expressed by a mining engineer. (Science and Art of Mining, May 27, 1911.)

The Peat Association of Canada is a new organization devoted to similar purposes as the American Peat Society. It has been chartered by and incorporated under the laws of Canada (presumably) and starts with a membership of one hundred. The Society plans to publish a monthly periodical relating to the utilization of peat, under the title "The Monthly Records of the Peat Association of Canada."

It is the announced plan of the new association to have as members only those who are actively interested in the peat propaganda and each applicant for membership must be recommended by two members in good standing, and have his application passed upon by a Committee on Membership. The list of officers has not yet been sent this Journal. They and the new Society have the best wishes of the American Peat Society. The plan of publishing a monthly journal commends itself, if material enough of suitable character is available for the purpose.

Captain W. A. Kerr, V. C., of London, England, author of "Peat and Its Products," a book published some years ago, is one of the recent applicants for membership in this Society. It is hoped that Captain Kerr will become a contributor for this Journal as well as a member of the organization.

California Peat enterprises are practically all either dead or in a state of suspended animation, according to a recent letter from one who has had much experience in trying to keep some of them alive. There is enough peat, but the prices of marsh lands are very high, and the great quantities of crude oil now available for fuel have completely revolutionized the

conditions formerly existing in the fuel markets of the state, and solid fuels are much less used than formerly.

After trying the production of peat fertilizer for a time, the company attempting the project has suspended operations on account of a number of adverse conditions, although there was considerable demand for the product where it was known.

Peat Industries, Limited. In a recent number of the Waterloo (Canada) Advertiser appeared the following account of the activities of this enterprising corporation:

"The peat plant at Farnham, No. 1, a branch of the Peat Industries, Limited, with head offices in the Imperial Bank Chambers, Montreal; No. 2 plant located near Lac du Bonnet, Man., and No. 3 at Julius Shelly, Man., where they are erecting a plant that will cost \$50,000, have purchased from the Government about 7,000 acres of land which constitute the best peat moss litter deposits on the continent. A new automatic machine costing \$25,000 will arrive from the United States for the Farnham plant in May. The capacity from this machine will be about 250 tons per day of finished product and will be kept in operation night and day.

"Last year the demand was so large for this fuel that the plants at Farnham and Manitoba were unable to fill all the orders received. It is a great saving over coal and can be burned in any stove or furnace, but the stoves the Peat Industries, Limited, have designed are specially adapted for the burning of peat and are more economical.

"Several Canadian plants have been merged into one concern under the name of "Peat Industries, Limited." The president is the well known railway contractor and mine owner, Mr. M. J. O'Brien, and the vice-president and managing director, Mr. L. B. Lincoln, who conducted the Farnham plant last year. The latter has a practical knowledge of peat and is confident when the public becomes familiar with it that coal will be a thing of the past as far as heating and a cheap fuel is concerned."

Later advices from the managing director state that the new automatic machine was received at Farnham about the time expected and has been tested with satisfactory results. More recently still the application for patents in Canada on the automatic peat machine developed by this company have been granted and the papers will soon be issued.

The National Fuel Company, with general offices at 2A Beacon street, Boston, Mass., and 31 Cross street, Portland, Me., is incorporated under the laws of Maine, with a capitalization of \$1,000,000. "Shares \$5.00 each, fully paid and non-assessable."

The officers are U. G. Gordon, First Vice-President; H. G. Adams, Treasurer; Frank A. Peacock, Engineer, and Hon. H. M. Looney, Attorney. It is the plan of this company, according to the prospectus, "to manufacture peat into fuel of a coal-like substance, thereby supplying a commercial commodity of great domestic utility." The process to be used is not described, but the only illustration in the prospectus shows some very smooth-looking briquets and peat briquets bearing the stamp of the company's name have been distributed from the Boston office. The development of this company will be watched with interest.

The Capac Paper Co., Incorporated. This new corporation has acquired the well-known peat paper plant and the bog on which it is situated at Capac, Michigan, and will, it is reported, entirely remodel the plant immediately, so as to begin commercial operations producing box-board, sanitary peat board, container board and other pulp and paper products. The officers of the new company are: L. M. Hart, President; Frederick C. Hart, Secretary-Treasurer; Charles E. Nelson, Vice President; C. F. Sisson, Assistant Treasurer; Frank Ream, Superintendent. The offices of the company are at Capac, Mich.

The Knox Fertilizer and Chemical Company's buildings and plant at Knox, Ind., were destroyed by fire early in May, just after the season opened. The company had been making peat fertilizer filler for some years. The plant changed hands in 1910 and it is not known whether it will be rebuilt.

The death of Ritmaster M. Rahbek, Director of the Danish Peat Society and an honorary member of the American Peat Society, was recently announced. It is hoped that an account of his life and work in behalf of the cause of more intelligent utilization of the Danish peat lands, which is being prepared, will appear in a future number of this Journal.

Manitoba Peat Bogs. From the Winnipeg "Free Press" of recent date, comes a statement that Mr. A. Anrep, peat expert of the Canada Department of Mines, was in that city early in July, after spending some weeks examining peat deposits in eastern Manitoba. Mr. Anrep is quoted as saying that so far he had found no peat bogs suitable for making peat fuel, but his investigations were not completed. He had visited Lac du Bonnet, Point du Bois, Whitemouth, Shelley and Julius. Later he was to examine points along Netley and Lake Winnipeg.

The Farmers' Peat Fuel Company is the most recent addition to the number of \$5,000,000 corporations in the peat field—"the Field of the Cloth of Gold," as the prospectus calls it. Furthermore informs us that the Company is organized and incorporated for the purpose of owning and operating the Lawrence patents and process for the manufacture of commercial and domestic peat fuel and for coking peat by a wet process. The company owns the sole and exclusive rights of the invention, patents and process for the entire world. The prospectus also states that the machinery used in the above mentioned process employs hand power only, is portable, and is supplied with peat mined by one man, the whole force necessary to operate the machine being three men and one boy, with an output, conservatively estimated, of three tons of finished product per day. The cost of "mining, milling and marketing" is given at \$3.00 per ton, and the selling price is put at \$5.00 per ton. The machine is commended by the company in its prospectus to farmers and owners of peat bogs generally, who can by this means make their own fuel. Mr. B. S. Lawrence, of Merchantville, N. J., will furnish full information to those desiring it. Mr. Lawrence was recently in Washington, D. C., on business relating to his patents.

The W. C. Nickerson Company, manufacturers of peat fertilizer, located at Huntington Beach, California, it is reported, will not operate their plant this season. The product was sold as fertilizer for orchards growing on soil deficient in organic matter and was in good demand among those who had given it a trial.

The American Peat Coal Company, which formerly operated a peat fuel plant at Pompton Plains, N. J., making air-dried machine peat, has entirely ceased operations, and the plant has been sold, it is reported, at a forced sale.

The Virginia and Carolina Chemical Company, which recently acquired the peat fertilizer filler plant of the Crescent Manufacturing Company, near Crescent City, Fla., has placed large orders for new machinery, and is putting the plant in a first-class condition for operations in the fall, as that is the best season for peat operations in Florida.

Mr. E. V. Moore, of Peterboro, Ont., writes, under recent date, that he has practically completed the plans for constructing a fully equipped plant for making peat fuel according to the latest designs and model of the senior Anrep, from detailed drawings furnished by him. The plant will include a power-

driven mechanical excavating machine especially designed by Mr. Anrep for digging peat, as the result of his long experience. Other interesting features of the projected plant are an improved pulping machine of new design and larger capacity than any previously designed by the inventor; an improved cable system for transporting the ground peat from the machine to the drying grounds, and an entirely new type of spreader. The machinery will be driven by electric power, each machine having its individual motor. A complete portable electric lighting system will be furnished for the spreading fields, and powerful lights will be placed on the excavator, so that work can be carried on both by night and by day during the working season.

Such a plant, properly supported by ample working capital, should be a commercial success and the Journal extends best wishes. The plan of building a plant on the best available European model is certainly to be commended, especially when the model comes from so experienced and capable an engineer as Mr. Anrep.

Peat Excavation in Massachusetts. During the early winter, workmen were employed for some days in digging peat in different parts of Tophet Swamp, according to the Ayer (Mass.) "News," and a number of barrels of the material were shipped to the experimental factory of the National Fuel Company, at Portland, Me., to be tested and made into briquets.

PATENTS RELATING TO PEAT AND SIMILAR SUBSTANCES.

A distillation furnace for fuels of high moisture contents, or for peat and the like, G. O. Wolters; German patent No. 229,606, Oct. 16, 1909. A gas producer is placed inside the shaft of the distillation furnace and the feeding device at the top is so arranged that the fuel can be supplied at will to the gas producer or to the distillation chamber. By this means the production of heating gas can be increased as desired according to the water content of the fuel to be distilled; and the heat radiated from the walls of the producer is utilized in the distillation.

Improvements relating to briquetting of carbonized peat and the like, Nils Testrup, England; English patent No. 18,232.

Apparatus for the drying of peat, E. Zohrab, Scotscaidder, Scotland, and J. Dunham-Massey, London, England; English

patent No. 21,816 of 1910. The apparatus consists of a chamber of polygonal cross-section, adapted to rotate intermittently about a horizontal axis and containing a number of steam-jacketed compartments (one for each side of the polygon), into which the molded wet peat is fed and subjected to the action of hot, dry air. Each compartment is provided with a conveyor belt; and the intermittent, angular movements of the chamber by which each segment is successively brought into position for discharging and recharging, also serve to bring surfaces of the damp peat into contact with the hot walls and to expose the surfaces to the hot air current.

Expressing machine for substantially complete drying of peat and similar substances by expressing the moisture therefrom, John J. Wheat, Coopersville, Mich.; U. S. Patent No. 949,787, Feb. 22, 1910. This machine has a pair of large, co-acting compression wheels having their rims so formed as to collect and carry off the water, means being provided for rotating the wheels and feeding the material to be dried to the interspace between them.

A press for de-watering peat and the like, The Peat Coal Investment Co., Ltd., London, Eng.; D. R. patent No. 234,424, Dec. 8, 1908.

Gas Producer, G. P. Davis, Detroit, Mich.; U. S. patent No. 980,923, Jan. 10, 1911. A pair of generator chambers having the upper, open, ends and ash pits, and a common water-seal at their lower ends, communicate by means of a passage just above the water level. Means are provided for closing the upper end of either chamber and for changing the direction of flow of the gas, the arrangement being that the gas issuing from the bottom of the open chamber passes through the connecting passage into the closed chamber, which it traverses in an upward direction and is drawn off by a side pipe situated above the zone of combustion.

CORRESPONDENCE.

The following extracts from a letter received early in July from Mr. Carl Kleinstueck will be of interest to all who plan to attend the annual meeting of the American Peat Society at Kalamazoo, Mich., Sept. 21-23, 1911:

"I am really too tired to write, but I have not heard from you, nor any other of our peat friends, for such an intermin-

ably long time that I simply cannot stand the suspense and must break it nolens volens.

"If the attempt to do so turns out shallow and sleepy, charge it to the American Peat Society, for in its services I have toiled since earliest spring, harder than the severest taskmaster would ask the lowliest slave to toil. Since February, I have not been in bed a single day after four o'clock in the morning, and many a time I have been at it at three o'clock and earlier. * * *

"But the results, in work accomplished, have been, in a way, very satisfactory, though I have not done nearly as much as I had hoped to do. However, my plant is in good working condition and I can at least redeem my promise to display to the peat convention a peat fuel factory in operation.

"I commenced pressing peat on May 24, and must, at this writing, have on hand something like 40 or 50 tons of machine peat, dry or drying.

"Everything has worked satisfactorily, except the workers, and it appears to me as if the labor question will be the rock on which our peat ship will go to pieces, for the utterly insufficient number of men which, after unspeakable trouble, can be drummed together to work in the bog are so high priced, and, on the other hand, so unreliable, shiftless and lazy, that it would be simply insane to expect the peat business to prosper, as long as it has to depend on help that is only available because it has been turned down on account of worthlessness, by manufacturers and farmers.

"And there enters another item into the controversy, which, so far as I know, never has been mentioned before, although it is perhaps more important than the all-pervading labor question, and that is the terrific heat in our bogs! Even if we should be able to secure good men and all we need of them, it is a very grave question whether any laborers in this country will be able to stand not only the temperature on the marshes, but also to perform an honest day's labor in it. I have found that I am able to stand considerable more heat than the strongest of my men, but during the first week in July, even I had to quit work on the marsh at 10 a. m.

"During the latter part of June and early July, we frequently had to work when the thermometer stood at 128° in the sun (and shade there is none)! and it was but natural that the amount of work accomplished was anything but adequate to cover the expenses.

"I have had Germans, Scandinavians, Poles, Irish, Italians, and also a few Indians, work for me, and they all had to capitulate to the horrible heat, the Italians, perhaps, holding out a little longer than the others; but this latter people are so ut-

terly unreliable in regard to keeping engagements, that I do not consider them any better than the rest.

"Unless we can find a way to get men who can and will work in the peat fields, it will be a more expensive pastime to run a peat plant than to navigate an airship or float an automobile! But, and here is the point, give me good men, and enough of them, and with wages at \$2.00 per ten-hour day (decent temperature), and I can solve the peat question easily and readily. With a Dolberg hand digging machine, a good man can raise 15 tons of crude peat from the bog. Let us be conservative and call it 12 tons; deducting 80 per cent. of water, would leave approximately 2:25 tons; the cost of the dry peat therefore would be 50 cents per ton.

"At the rate of \$2.00 per ton of finished product, I can press all the peat I can get thrown into my Dolberg grinder with the aid of six or eight men, and lay it out to dry, either on the hillsides, or in the drying sheds. That estimate includes expenses for fuel, etc., but not for incidentals. Allowing 50 cents more for the value of the peat taken from the land, although so far my land has been vastly improved by the "diggings," and for every possible and impossible thing additional, and I produce peat fuel at **\$3.00 per ton!** This I consider perfectly satisfactory, because I know that I can sell all of the peat I am able to produce, and a few hundred times as much more, at \$5.00 per ton, to people who have used it before and know its value. But, as stated, before we can do this, climate and men have to be regulated to suit the pertaining conditions.

"On Gun Marsh, where I formerly made peat fuel, I have had to work repeatedly when the thermometer stood at 135° F. in the sun, and the thermometer was a tested, standard instrument at that. Can you tell me of a race of human beings capable of rendering an honest day's work in such a temperature? Yet the moment the sun goes down the air gets cold and chilly. On the inside of the door of my "Villa Shantiosa," at Gun Marsh, is the following weather report: 1903, July 1, temperature 4 a. m., 30 deg. F.; noon, 90 deg. F.; 7 p. m., 38 deg. F. The ditches around my camp had a quarter of an inch of ice on them in the morning of July 1st, yet a day or two later, the thermometer stood at 128°+ F. from about 10 o'clock in the morning until nearly 3 o'clock in the afternoon. I really think our Society ought to regulate the climate before making any further attempts at peat making.

It seems as if all of the peat men were heat bound, for, as already stated, I have not heard from any of them for weeks or months. I am slowly getting anxious about our meeting.

"Sincerely yours,

"CARL G. KLEINSTUECK,

"Saxonia Farm, Kalamazoo, Mich., July 8, 1911."

RECENT PUBLICATIONS.

Experiments in Blueberry Culture, F. V. Coville, U. S. Dept. Agri., Bureau of Plant Industry; Bulletin 193, 100 pp., 18 plates and 31 figures. A very interesting account of the author's work in discovering the conditions of growth required by the blueberries, especially the one most valuable for market, the swamp, or high-bush blueberry, as it is called in northern New England, and the methods of propagating it. Acid, partly drained peat bogs furnish the best soil for growing this species, and as there is always a good demand at high prices for the fruit, and as the bushes grow quite rapidly and are profuse bearers, the attention of the owners of suitable bogs or swamps is especially called to the bulletin. It may be had free of charge by applying to the Secretary of Agriculture, Washington, D. C.—C. A. D.

Utilization of Peat in Norway (Iron and Coal Trades Review, April 14, 1911). The British consul at Christiania reports that the secretary of the Norwegian Peat Moor Society, in a recent lecture, discussed the prospects of erecting large industrial establishments in the near future on Norwegian peat moors. He stated that the largest suitable peat areas in Norway were in the north, and cited instances of peat moors in Pomsdalen (some 200,000 acres), mostly near the sea and suitable for the industry; and, also, large tracts in the Trondhjem district, and in Nordland and Prosoe prefectures, including some 25,000 acres on Adoen Island, close to ice-free harbors and generally free from frost in the ground, so that they could be worked all the year round. The lecturer considered that the solution of the peat problem for greater industries claimed by the Swedish authorities, would prove of great importance to the present development of the Norwegian iron and steel industry. He accordingly advised that no obstacles should be placed in the way of foreign capitalists desirous of erecting large industrial works on Norwegian peat moors. The surface peat only might be sold to them and regulations framed to insure the land being left sufficiently drained to permit of subsequent cultivation.

Reclamation of Southern Louisiana Wet Prairie Lands, I and II, A. D. Morehouse; Scientific American Supplement, 1843:270, and 1844:276; illustrated. An illustrated account of methods employed in this important drainage work.—C. A. D.

Heat from Dust; the Utilization of Low Grade and Waste Fuels, Charles L. Wright; Scientific American, May 6, 1911,

444 and 456; illustrated. Describes methods and plans for briquetting coal and lignite and states that peat cannot profitably be briquetted by the same method used for coal and lignite. In 1909 there were 16 plants for briquetting fuel in the country, one-third of which were, in the author's opinion, on a practical basis.—C. A. D.

The Utilization of Peat Bogs for Power Production and the Recovery of By-Products, Carl Heinz. (*Die Ausnutzung unserer Torfmoore unter Berücksichtigung der Krafterzeugnisse und der Beeinflussung unseres Volkwohlstandes*). Ills. Zeitsch. d. Ver. Deutscher. Ing., Mar. 11, 1911.

Power Production from Peat, Gwosdz. (*Kraftgewinnung aus torf.*) Describes the utilization of peat for power generation in gas producers in Sweden, Germany and Austria. Gas-motortechnik, Feb.-Mar., 1911.

Peat Development; St. Johns (N. F.) "Royal Gazette and New Foundland Advertiser," Sept. 6, 1910, and seven later numbers, ending Jan. 31, 1911 (Vol. CIV, No. 5). An unsigned critical review of the manufacture of peat fuel, by a well informed English writer with positive views. The series is well worth careful reading by every man who wishes to learn all of the defects of most methods of preparing and using peat, which have been tried in Canada and Europe, as well as some of their good points. The author lays constant stress upon the fact that there are practically no new things under the (peat) sun, and emphasizes his points by citations, and in this respect, as in others, his contribution is a valuable one. In the last paper of the series, No. VIII, he describes his own ideals of peat fuel. (See also article, "New Foundland Notes," in this number.)—C. A. D.

Effects of Lime on Peat Soils, H. von Feilitzen; Svenska Mosskulturfoer. Tidskr. Vol. 24, p. 95. Describes the influence of lime, of different degrees of fineness, applied to peat deposits for agricultural purposes. Better yields were obtained with lime than with ground limestone, and the fineness of 0.2-0.5 mm. gave the best results.—H. P.

Ammonia Recovery and Power Gas from Peat. N. Caro, in Elektrotech. Zeit., Vol. 31, p. 1,138, discusses the distillation of dried peat, and advises the application of the Mond Process for wet peat, using steam and air at 400-450° C. 85% of the nitrogen is recovered as ammonium sulphate.

The figures included in the article show that one ton of

peat gives 40 kg. ammonium sulphate, valued at \$2.00. The gases from the distillation give 650-750 H.P. hrs. Figures are also given showing the vast power stored in the German peat deposits.—H. P.

Value of Swamp Lands, or How to Make Black Soils More Valuable. Published by German Kali Works, 93 Nassau street, N. Y. Pamphlet 16 pp. Illustrated. Sent free on application to the publishers. Describes the results of the use of potash salts on organic soils, giving the results obtained at various State Agricultural Experiment Stations.—C. A. D.

Chemistry of Peat. Chas. S. Robinson, Jour. Amer. Chem. Soc., 1911, Vol. 33, p. 564. Although the organic nitrogenous compounds in peat have been under investigation for over one hundred years, the actual isolation of such compounds in the crystalline form has been attained only very recently.

Leucine and Isolucine have now been obtained from peat by sulphuric acid extraction. The peat used was the common brown peat, containing 2.53% nitrogen, of which 9.18% was in the amido form. The peat is extracted on the sand bath with 25 parts of 25% sulphuric acid for 48 hours, filtered off and the excess of mineral acid precipitated. The filtrate is slightly acidified with phosphotungstic acid until it fails to cause a further precipitation; it is then filtered, the filtrate treated with barium hydroxide and the solution concentrated. The waxy knobs and clusters formed are purified, etc.—H. P.

Peat Gas Power in Germany. F. E. Junge, Power, 33:23:882-883. June 6, 1911. Ill. After a general presentation of the fuel supplies of Germany and the utilization of peat there, the Heinz gas producer is described as eliminating some of the difficulties met in the use of older types.—C. A. D.

Peat Fuel in Canada. Practical Engineer, 15:6:413, June, 1911. A short review of the present status of the production of peat fuel.—C. A. D.

Neuer Torfkoks. Zts. f. Moorkulture, 12:30:1910, p. 311. Describes the Laval process for coking peat.—C. A. D.

Peat Society Meeting. Power, Apr. 4:4:1911. A report on the meeting of the New York Section, held Mar. 21, 1911.—C. A. D.

Reclamation Drainage in South Dakota. A. B. McDaniel. Engineering News, 65:13:374-376. (3:30:11); 4 ill. A general

account and summary of the laws relating to drainage in the state. A description is given of the Clay Creek drainage ditch, which drains 33,000 acres of bottom lands and indirectly 35,000 acres of bench upland besides.—C. A. D.

Peat Bogs of Canada. Fuel 15:22:838. (3:28:11.) Brief note of giving area and estimated tonnage.—C. A. D.

The Fuels of the South. I. C. White. Coal Trade Journal, 3:29:11. An address before the Mines and Mining Section of the Southern Commercial Congress. The author says: "The quantity of liquite and peat in these Southern States would add many billions to the 519 billions of tons of bituminous coal of the southern part of the Appalachian coal field." Florida has "a very large area of peat, which, under the wand of the modern gas engine, can cheaply produce an enormous quantity of light, heat and power." To Georgia the fates have given "large deposits of peat." Louisiana, within her borders, has large peat deposits, and of Mississippi it is said "large supplies of peat and some liquites occur within her borders."—C. A. D.

Peat Bed of Anticosti Island, The Geologic Bearing of, W. H. Twenhofel, Am. Journal of Science, 30 (1910) pp. 65-71. Describes an interesting growing peat deposit and points to its geological significance.—C. A. D.

Preliminary Report on the Peat Deposits of Florida. Roland M. Harper. Third Annual Report, Florida State Geological Survey, pp. 197-375. This may be obtained in separate form by addressing the State Geologist, Dr. E. H. Sellards, Tallahassee, Fla. (See Vol. IV., No. 1, this Journal.)

Torfmoore und deren Ausnutzung in den Vereinigten Staaten von Nord-Amerika. Dr. B. von Herff. Die Ernährung der Pflanze, 6:8:85-88; Apr. 15, 1910; 2 maps and 6 half-tones. A brief account of the distribution and agricultural value of the peat deposits of the United States.

Government Peat Bog at Alfred, Ontario. The Canadian Engineer, 20, 451-454. (March 23, 1911.) Ten illustrations. A complete, well-illustrated description.

Generation of Power from Peat. T. Arthur Mighill. Power and the Engineer. Sept. 6, 1910, pp. 1605-1607. Abstract of paper read at the Ottawa meeting of the American Peat Society.

Peat Fuel for Gas-Producers. Practical Engineer, Sept., 1910. Reprint of article in this Journal, Vol. 3, No. 1.

Some Notes on the Utilization of Peat Mosses. The Pulp and Paper Magazine of Canada, Aug., 1910, 193-194. A criticism of promotion literature of the Anglo-Swedish Peat Paper Company.

The Exploitation of Peat Bogs. Metallurgical and Chemical Engineer, 9:2:78-79, Feb., 1911. An abstract of Dr. Eugene Haanel's presidential address at the Ottawa meeting of this Society.

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Journal of the American Peat Society

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Nos. 3 and 4

THE KALAMAZOO MEETING.

Although now some time past, the Fifth Annual Meeting of the American Peat Society, held in the city of Kalamazoo, Michigan, on Thursday, Friday and Saturday, September 21, 22 and 23, 1911, still lives and will long live in the memories of those who had the good fortune to be present, as a particularly bright spot in the history of the organization.

The sessions were well attended, the program was sufficiently varied to give everyone present an interest in the papers, and the discussions were often enlivening and full of practical suggestions.

The dominant notes of the meeting were two: First, the use of peat in the gas-producer as a source of power; and, second, the use of peat lands in agriculture. The second phase was especially emphasized by the numerous examples of highly cultivated areas of peat land in the vicinity of the city in which the meeting was held. Although these were the dominant notes at the meeting, scarcely less important were the discussions relating to recently invented modifications of the methods for preparing peat for fuel purposes, which, after all, are the fundamental matters for the consideration of the Society.

The meetings were held at the Court House, which had been generously offered to the Society by the County authorities, and every facility was provided for the comfort and welfare of the delegates by the hospitable citizens through their Entertainment Committee and the Board of Trade. The first meeting was held on Thursday morning, September 21, and was called to order by Vice-President Kleinstueck, who, with fitting remarks, introduced the Mayor of the city, Hon. Charles H. Farrell. Mr. Farrell gave a most cordial address of welcome and expressed his great interest in the purposes and aims of

the Society and extended the freedom of the city to the delegates. Following Mr. Farrell's address, the chairman read a letter from President Eugene Haanel, in which he stated that on account of the serious illness in his family it would be impossible for him to attend. This letter was received with profound sympathy by the members of the Society and gave the only note of sadness noticeable at the meeting. Dr. Haanel stated that he would be represented at the meeting by his son, who would render an account of the work which had been done by the Department of Mines of Canada in the furtherance of the peat industry in that country. Letters were read from the Director of the Federal Bureau of Mines, Dr. Joseph A. Holmes, regretting his inability to be present at the meeting on account of a journey to Alaska and also expressing his sympathy with, and interest in, the work of the American Peat Society. Letters were also received from the Power-Gas Corporation, Ltd., of England, and from Dr. N. Caro, of Germany, regretting their inability to furnish papers relating to the work which they have accomplished in the production of gas and power from peat, and promising at some future time to give the Society some statements about their processes. A letter and a beautifully engraved invitation to the Society, asking that the next annual meeting be held in Chicago, Ill., was received from the Chicago Association of Commerce. A telegram was also received from Dr. Joseph Hyde Pratt, the first president of the Society, stating that, because of a serious accident, he had been unable to leave home to attend the meeting, as he had hoped and planned to do.

At this point the regular order of business procedure was suspended until the afternoon session and the presentation of papers began.

A very interesting and important innovation was introduced at this meeting, by Vice-President Lincoln. Just before the noon adjournment, the members of the Society were invited to the Majestic Theater, and were there shown by Mr. Lincoln, in a series of moving pictures, the methods used in surveying a peat deposit, of getting it ready to work and in digging the peat and preparing it for fuel at the plant of the Peat Industries Limited, at Farnham, Canada. The machinery shown had been developed and patented by the lecturer and was operated under his direction during the summer. The exhibition was almost equal to being at the plant, as the pictures showed very plainly the working of the new machine, and the results of its work. Mr. Lincoln received much well-merited praise for his demonstration, which was unique in the history of the meetings of the American Peat Society.

The program as carried out was as follows:

PROGRAM.

THURSDAY, SEPTEMBER 21, 1911.

Morning Session.

1. The Recent Development of Peat as a Power Factor
—Dr. T. A. Mighill, Boston, Mass.
2. Some Remarks on Professor Lipman's 1909 Report on
the Availability of Nitrogen in Peat.
—Herbert Philipp, Perth Amboy, N. J.
3. Peat as an Agricultural Asset.
—T. S. Gladding, New York
4. An Up-to-Date Peat Plant. (Illustrated by moving
pictures, exhibiting the plant of the Peat Industries,
Ltd., Montreal.) —L. B. Lincoln, Chicago

Afternoon—Business Meeting.

Reports of Committees.

Financial Report.

Annual Report of the Secretary.

Report of the Executive Committee.

4 P. M. Visit to the Saxonia Farm peat-fuel plant.

FRIDAY, SEPTEMBER 22, 1911.

Morning Session.

Visit to the A. M. Todd Co.'s farm at Mentha.

Afternoon Session.

5. Peat Bogs in Michigan from an Agricultural Point of
View. —Prof. A. J. Patten, Mich. Agl. Exp. Station
6. Recent Developments in Peat Machinery.
—E. V. Moore, Peterboro, Ontario
7. Observations and Deductions from Travel and Corres-
pondence. — Francis J. Bulask, Toledo, Ohio
8. Power from Powdered Peat.
—Dr. J. McWilliam, London, Ontario
9. Report on Peat Gas-Producer Tests of the Canadian
Department of Mines. —B. F. Haanel, Ottawa, Can.

Friday Evening.

Reception by Vice-President and Mrs. Kleinstueck.

SATURDAY, SEPTEMBER 23, 1911.

Morning Session.

10. Excavation of Peat by Vacuum.
—J. H. Van Glahn, Toledo, Ohio
 11. The Peat Outlook in the Northwest.
—Max Toltz, St. Paul, Minnesota
 12. Peat Briquetting.
—George J. Mashek, New York
 13. An Important New Peat Machine.
—Dr. W. Wielandt, Oldenburg, Germany
 14. Some Aspects of Florida Peat Bogs.
—John N. Hoff, New York
 15. Recent Progress in Preparing Peat for Fuel.
—Charles A. Davis, Washington, D. C.
 16. Peat in Agriculture.
—Paul Todd, Kalamazoo
- Election of Officers.
Report of Committee on Resolutions.
Adjournment.

The papers which were presented will appear in this and succeeding numbers of The Journal. The visit to the Saxonia Farm peat-fuel plant was of great interest and profit to the members. The plant was simple and yet sufficiently well equipped for the production of a good quality of machine peat. The digging was done with the Dolberg modification of the common type of hand-digging machine used in European countries. This machine consists of a vertical prismatic knife which is pushed down through the peat by man power applied to the carrier by rack and pinion and cuts a prism of a foot and a half square through the entire thickness of the peat deposit. The peat is then raised, and removed in slices from the prism and taken, at this plant, by small tram-cars to the macerating machine where it is ground, formed into bricks, and removed from the machine on wooden pallets, which are placed on cars as fast as removed and taken to a drying shed, where the pallets are laid on racks, or to the drying grounds where they are laid directly on the ground. The macerating machine was operated by a small steam engine, the boiler of which was fired with peat fuel.

The excursion to the great truck and peppermint farm, at Mentha, where the members of the Society were the guests of the owners, A. M. Todd & Co., under the direct guidance of Mr. Paul H. Todd and Mr. E. L. Woodhams, the superintendent of the farm, was a most interesting experience to most of the members. Here was seen a very large area, of several

thousand acres in extent, of peat land, part of which had been drained and reduced to a state of cultivation and part of which was still in the uncleared condition. On this land were seen crops of various sorts, including peppermint, of which the company is a famous producer; spearmint, wormwood, celery, lettuce, cabbage, onions, and other kinds of medicinal plants and "truck" crops. The methods of cultivation, fertilization, and treatment of the land were explained, as well as the methods of planting, growing and harvesting the different crops. The process of recovering the oils from those plants, such as peppermint, which yield volatile oils, and the system of storing and marketing the truck crops were fully explained to the members of the Society by the guides.

Not the least interesting part of the excursion was the ride of some 40 miles through the country in automobiles. During this trip the various kinds of farming lands in that section of Michigan were seen and the native vegetation was shown here and there in the wood lots which had been spared by their owners. Many areas of peat land were seen under cultivation, and it was noted that in this section celery, onions, and similar crops were grown very successfully on this sort of land. It was very evident, from the observations made, that peat land can be very profitably devoted to agriculture, if proper methods of drainage and fertilization are observed, and it is also evident that the use of peat for agriculture is, in many places, likely to so increase the value of peat deposits that it will be impracticable to use them as sources of fuel if operations are not soon begun.

The social side of the meeting was one of the most valuable features, the long ride through the country, the opportunities for getting together in small groups while walking over the land, and especially at the reception of Vice-President Kleinstueck and his family, gave most ample opportunities for the members to become better acquainted with each other and with the work which was being done in the different lines which each finds of most interest. This phase of the subject, however, is more fully treated in another place.

The business relating to the welfare of the Society should be summarized in this place. At the meeting on Thursday afternoon, business matters relating to the welfare of the Society and its future growth, were discussed at length, largely at the initiative of the Executive-Committee, who submitted a report which is given below. Of the recommendations which were thus submitted, the following were adopted:

Prof. C. A. Davis was constituted a committee of one on the publication of The Journal, to formulate plans for the fu-

ture, and made Editor-in-Chief. It was voted to appoint J. N. Hoff, Dr. Charles F. McKenna, and Herbert G. Philipp a committee of three, to duly and properly incorporate this Society, to report on amendments to the constitution, and to submit a revision of the By-Laws for adoption at the next Annual Meeting. The Executive Committee was empowered to act on the question of securing headquarters for the Society. It was voted, in view of the fact that the Eighth International Congress of Applied Chemistry was to hold its meeting in New York in September, 1912, that the next Annual Meeting be held in New York City, the exact date to be fixed by the Executive Committee. (As the Chemical Congress has its session early in September, the date will be about that time.)

The following officers were elected for the ensuing year:

President—Dr. Joseph A. Holmes, Director of U. S. Bureau of Mines, Washington, D. C.

Vice President for Eastern Section—John N. Hoff, New York.

Vice President for New York Section—Dr. Charles F. McKenna, New York.

Vice President for New England Section—Dr. T. A. Mighill, Boston, Mass.

Vice President for Southern Section—Robert Ranson, St. Augustine, Fla.

Vice President for Eastern Great Lakes Section—Karl Kleinstueck, Kalamazoo, Mich.

Vice President for Western Great Lakes Section—L. B. Lincoln, Chicago, Ill.

Vice President for Pacific Section—C. V. Imeson, Los Angeles, Calif.

Vice President for Minnesota Section—Max Toltz, St. Paul, Minn.

Vice President for Canada Section—Dr. J. McWilliam, London, Ontario.

Executive Committee—Dr. Charles F. McKenna, Julius Bordollo, John N. Hoff, G. Herbert Condict, John W. Hornsey, Herbert Philipp.

Secretary-Treasurer—Julius Bordollo, New York.

REPORT OF THE EXECUTIVE COMMITTEE.

Fifth Annual Meeting, Kalamazoo, Mich., Sept. 21st, 1911.

Dr. Eugene Haanel, President, American Peat Society.

Dear Sir:—The Executive Committee, which you appointed at the last Annual Meeting of this Society, beg to hand you herewith their report.

The members whom you appointed lived within a radius of twenty miles of each other, and thus the Committee were always able to have a quorum present at their meetings.

Membership.—Our first efforts were directed to increase the membership of the Society, which we endeavored to do by the circulation of letters and descriptive matter among our members and interested parties. In response to the amount we circulated we received only a few new members, but we think that in the coming year we shall have a larger increase than heretofore.

Journal of the Society.—One of the most important and most discussed subjects, which seriously occupied the attention of your Committee, was regarding our Journal, and we have the following suggestions to make:

That the Editorial Committee shall consist of Editor, Abstract Editor and two other members of the Society. This Committee shall have all rights regarding the papers, abstracts and the publishing of The Journal.

This Editorial Committee shall be appointed by the managing officers and the Executive Committee together.

Associate Editors can be appointed by the Editor or Abstract Editor, and must be approved by the Editorial Committee.

The Editorial Committee shall have full charge of the publishing, and assume the responsibility for the prompt issuing of each number.

The October issue, 1911, of The Journal to end Volume No. 4, and beginning with January, 1912, The Journal (Volume No. 5) to be published monthly, except for two months in the year, e. g., July and August; thus making ten issues per year, which shall complete one volume.

Incorporation of the Society.—This subject was early discussed by the Committee, and your Committee strongly recommends the incorporation of the Society. Mr. John N. Hoff, of New York, has volunteered to secure the incorporation at the cost of the fees only. We suggest that he be appointed a Committee on Incorporation, to undertake the incorporation of the Society.

Headquarters of the Society.—Your Committee has thought it desirable to discuss this question, with the result that the Chemists' Club of New York is considered the most desirable place. Your Committee at its last meeting, appointed Dr. Charles F. McKenna as a Committee on ascertaining the cost of establishing headquarters at the Chemists' Club, with the privilege of the committee rooms, etc.

1912 Annual Meeting.—It has been thought eminently desirable to suggest New York City as the place for the next (sixth) annual meeting, inasmuch as the International Congress of Applied Chemistry meets in New York in September, 1912, and that the American Peat Society co-operate with the Congress. We would mention that our esteemed member, Prof. Chas. A. Davis, has already been appointed Chairman to the Peat Sub-Fuel Section, by the International Congress. Your Committee has appointed Dr. Chas. F. McKenna and Mr. Julius Bordollo as a Committee on Co-operation with the 8th International Congress of Applied Chemistry, and they are now in communication with the Corresponding Committee of the Congress.

Committee on Papers.—This Committee appointed Prof. Chas. A. Davis, Dr. Chas. F. McKenna and Mr. Bordollo as a Committee on Papers for the 1911 Annual Meeting of the Society.

Auditing Committee.—In order to shorten the business at the Annual Meeting, your Committee appointed Messrs. J. N. Hoff and H. G. Condict as Committee on Auditing the Treasurer's Books, which work they undertook, previous to the last meeting of this Committee, Aug. 29th, 1911, finding the Treasurer's books in correct condition. We would here suggest, that in future the Treasurer's books be closed on July 1st of each year, and thus enable the auditing and reporting of same, previous to the rush of work for the annual meeting.

Use of Proxies.—Your Committee recommends, as in other scientific and non-mercenary societies, that no proxies, of members not present, be recognized, and only those members present be entitled to one vote each.

Amendments.—This Committee suggests and strongly recommends the following amendments of the Constitution and By-Laws of the Society:

Amendments to the Constitution.

Clause 2. Add the words ".....or where the Executive Committee shall designate."

Clause 3. To be condensed as follows: "The purpose of the Society shall be to investigate and encourage the utiliza-

tion of the vegetable products known as peat, turf and bog deposits. To gather and disseminate all information in connection with peat, turf and bog deposits. And to conduct experiments, should the Board of Directors deem it expedient."

Clause 4. To read: "The officers of the Society shall be a President, three Vice-Presidents (first, second and third), a Secretary, a Treasurer and an Executive Committee consisting of not more than six members. These together shall have full charge of the Society and form the Board of Directors. The duties of these officers shall be such as usually pertain to their offices or as shall be fixed by the By-Laws."

Clause 7. Add the word: ".....present."

By-Laws.

Article 6. Change end of sentence to read: "....., each active member present shall have one vote."

Nominations.—To further facilitate the business part of the Annual Meeting, your Committee appointed themselves a Committee on Nominations, and make the following suggestions as to Officers of the Society for the ensuing year:

For President—Dr. Joseph A. Holmes.

For First Vice-President—Dr. J. McWilliam.

For Second Vice-President—Carl Kleinstueck.

For Third Vice-President—John N. Hoff.

For Secretary-Treasurer—Julius Bordollo.

For Executive Committee—Herbert Philipp, G. Herbert Condict, John W. Hornsey, Chas. A. Davis, C. M. Crouse, Chas. F. McKenna.

Expenses.—The expenses of the Committee which were borne by the Society, included only the printing of membership blanks, letter-heads, envelopes and the mimeographing of the Committee Bulletin, amounting in all to \$11.70. The balance of the expenses, including chiefly postage and stationery, was borne by the Committee Secretary, and amounted in all to \$11.71.

We would here also mention that Mr. John N. Hoff very kindly defrayed the postage expense of the mailing of 2,000 circulars regarding the 1911 Annual Meeting of this Society, the expense amounting to \$20.00.

Appended to this report you will find the minutes of each meeting of your Executive Committee.

Respectfully submitted,

CHAS. F. MCKENNA, Chairman.

HERBERT PHILIPP, Secretary.

Perth Amboy, N. J., Sept. 15th, 1911.

REPORT OF THE SECRETARY-TREASURER.

Financial Report, From July 25, 1910, to July 1, 1911—Read
at the Kalamazoo Meeting.

Receipts.

Annual dues, from 72 members	\$327.67
2,000 Special copies of Journal	400.00
Extra copies of Journal	37.70
Advertisements	52.00
Refund for lost manuscript	49.50
Reprints	10.25
<hr/>	
Total Receipts	\$877.12
Cash on hand, July 25, 1910	22.84
<hr/>	
Total	\$899.96

Disbursements.

Printing and forwarding of Journal of July, 1910, and double number, Oct.-Jan.....	\$488.24
Stenographic Report, Ottawa meeting.....	75.00
Stationery	75.23
Postage	82.19
Expressage	2.85
Sundries	30.67
<hr/>	
Total	\$754.18
<hr/>	
July 1, 1911, Cash on hand	\$145.78

Respectfully submitted,

JULIUS BORDOLLO, Sec'y.-Treas.

Audited and approved:

G. HERBERT CONDUCT,
JOHN N. HOFF,

Auditing Committee.

Number of Members.

July 1, 1910,	119
Gained new members.....	44
	<hr/>
	163
Lost by non-payment and two deaths.....	27
	<hr/>
	136
July 1, 1911, net gain.....	17

Mail Account.

Letters written and typed.....	753
Requests for renewing memberships.....	157
Packages, sample copies and literature.....	183
Circulars and cards	7300
	<hr/>
Total	8393

THE SOCIAL SIDE OF THE KALAMAZOO MEETING.

Ernest V. Moore.

It is true that the main purpose of the Conventions of the American Peat Society, outside of propagating itself, is, to further the economic use of peat by listening to papers by different members, each in his own particular line. It must be admitted, however, by any member in whose heart was sown even the smallest seed of the abundance of goodfellowship that was everywhere shown at the Fifth Annual Meeting, that the getting better acquainted, first by individuals and afterwards by interests (in some cases apparently conflicting), is, after all, almost equally the aim of these gatherings. It is sad, but also true, that the possibilities before the peat man are so great as sometimes to dwarf his natural charity and to make him suspicious, or even antagonistic, towards his peat neighbor to the mutual hurt of all concerned. There is little opportunity during the formal sessions of our Society to get better acquainted in a way to dispel the feeling that, possibly, our neighbor may be trying to put something over our head. This feeling sometimes may be fostered by the very silence of the man beside us, and therefore, there have developed in connection with our annual convention and its routine work, meetings in a somewhat different atmosphere, purely social, in which we are brought together by a common interest, not so much in peat, as in learning to know each other. To thus establish friendships in a way that will permit the unrestricted interchange of experience with peat or otherwise, of necessity is beneficial.

At such meetings we may ask the silent man, without affront, what is his particular interest in peat, and good humoredly jolly the boastful man until for sake of peace he must admit how much really solid ground he has to stand upon. There also we can explain what we believe to be errors in the judgment of our peat brothers without the conspicuousness of public discussion. In fact, there, being amongst friends, we can afford to be friendly.

These more or less ideal, revival-aftermeeting conditions, where communing of spirit and flow of soul were greatly in evidence, were practically realized, at the Kalamazoo meeting on three particular occasions, although it is no stretch of the imagination to say they were in evidence at all times. Particular reference, however, must be made to the reception tendered the Society by Vice-President Carl Kleinstueck, at his farm, "Saxonia," on Friday evening, September 22nd, to the organization meeting of the Modern but Oriental Order of Pumpernickels which took place immediately afterwards, and to a smaller gathering of congenial Peaters the evening previous. Taking these events up in order of time, one has to drop back a year to get at the occasion when the joy embryo, latent in all good peat men, first gave evidence of life. The story is as follows: During the formal dinner given by the Canadian Department of Mines to the members of the American Peat Society, at the Fourth Annual Meeting, one gentleman present concluded a few well received remarks with the cry, "Hello, Pete." The gentleman expressed so much good fellowship in this very concise form that the thought simultaneously came to several minds that a meeting should be held to see what structure might be erected with such good material to start with. Accordingly, one dark night during that convention, sometime after the city clock had tolled the midnight hour, a number of peaters of good standing gathered in an isolated room, whispering to each other such mysterious words as men engaged in wooing the elusive Spirit of the Moor naturally would use, when it was discovered that one of their number was absent. A searching party was organized and the missing peater was soon discovered, clothed in his most becoming sleeping regalia. Like a true brother, however, he responded to the summons, joined his brother muckers assembled and the secret conclave. After a long draught from the peaters' loving cup he expressed himself in no uncertain terms as to the worthy aims of the assembled brethren and adorned his oration by describing in most touching terms the pathetic experience of a brother who had an impediment in his speech.

The moral of this story was so strong and the recital so

impressive that the peaters assembled decided unanimously that it should be repeated annually as part of the secret and symbolic ritual of the peat fraternity, and that this original and very beautiful piece of work should be accepted as the second stone on which this inside organization might safely build. Later it was agreed to organize on lines adopted by other secret fraternal orders, and the peaters adjourned to meet at Kalamazoo.

Cherishing the memory of this first meeting for over a year, it was most natural that as the midnight hour of the first evening of the 1911 Convention approached, certain gentlemen attending should almost unconsciously gravitate towards a meeting place. A password, "No. 208," went from lip to lip, and eventually many of those present a year previous were again together. After the door had been carefully closed and tyled, the peaters' loving cup was prepared and partaken of with due solemnity and the second session of the peaters began.

Much regret was expressed that the peater of sleeping garment fame was not on hand, but when those present learned that he was most busily engaged in preparing for further edification and entertainment of the Society, the deliberations proceeded without him.

The decision of the first session, that the customs of older fraternal orders could not be improved upon was confirmed, and therefore, strict attention was paid to each word of wisdom uttered and to each graceful gesture made, so that nothing worthy of a place in a beautiful and impressive ritual might escape. It was not surprising that one brother in relating an experience of his while studying one of the various forms of mental aberration to which mankind is prone, should provide the new brotherhood with a suitable call which, of course, demanded an answer, to be given in the form of a sign. As the significance of this call and sign does not rest in the acts themselves, but rather in their hidden meaning, and as these acts are more or less conspicuous, and as the general public might be at a loss to comprehend such strange antics in, shall we say, an elderly gentleman, it is no breach of the peaters' obligations to mention that the call adopted is a whistled imitation of the call of a "lark," and the answering sign an imitation of the flapping of his wings, gracefully accomplished by use of the arms, and it is by this call and sign that all true peaters are recognized.

The serious work of the evening being thus accomplished, this second meeting of the Peaters became history and another day had come.

Later in the day, the American Peat Society visited Sax-

onia Farm, the home of Peater Carl Kleinstueck, and were cordially greeted by its owner. Here opportunity was given to advance much in the science of peat fuel making by observation of a complete Dolberg Machine Peat Plant with hand-operated mechanical excavation, in operation. This is mentioned only to point out that the Peaters devote much of their time to hard and practical work, and not, as some might surmise, to their secret conclaves.

Time will pass, and 8 o'clock Friday evening eventually arrived, and with it a quickening of the heartbeats of every true peat brother. Why? They were to be entertained by a brother who had proven his sterling worth, not only to those of his peat brethren by whom he had been tried and found worthy of the Peater's password, but if report speaks true, by his fellow citizens in general.

The Peaters, therefore, having revised their toilets and having acquired suitable tokens for host and hostess, went again to Saxonia Farm. What if a meaning look was passed from one Peater to another as the State Asylum was passed? The car soon reached its destination, the Peaters dismounted, and hand to shoulder of the man ahead, marched in imposing file to the room provided for hats and coats. Here one of the members was chosen to make the presentation to the hostess, the procession reformed and to the delightful strains of the orchestra the stairs and hallway were again negotiated and the presentations made.

The hostess very graciously welcomed the Peaters and the orchestra played that soul-inspiring air known to every one present, either as "My Country, 'Tis of Thee" or "God Save the King." After this the Peaters' call and its answering flutter were given, and the procession was again formed to repair to the **sanctum sanctorum** of the host, a log addition to his beautiful home, seemingly built for just such an occasion.

Kalamazoo being the home of celery, and as Peaters observe no convention more than that of being appropriate, a luxuriant bunch of celery was deemed a fitting token for the host. This was presented with such touching ceremony that the host was seen to borrow an extra handkerchief, apply it to his eyes, and then appear to wring therefrom great drops of salty appreciation, which so endeared him to the true Peaters present that they were with difficulty restrained from falling on his neck and doing likewise.

When the stress of these bottled-up emotions had exhausted itself, time was taken to look around one of the most unique and interesting rooms ever owned by a private individual. The reception hall was built entirely of tamarack logs,

left in the rough. In the center was a table on which was inconspicuously noticeable a genuine Peaters' loving cup, surrounded by many glasses. One end of the room was taken up by a huge, old-fashioned stone fireplace, in which burned a peat fire big enough to convince any skeptic that these peat men, though they appeared to be very light-hearted, were working towards a very serious end.

A whole evening would not be sufficient to exhaust interest in the many curiosities that adorned the walls, and more particularly in the flint arrow-heads and rudely cut stones, evidences of an earlier occupancy of our country. Closest attention was paid while the host explained how this and that relic came into his possession and its probable history.

In the meantime some of the more exuberant Peaters evolved a sort of college yell for the fraternity which was given a number of times with a right good will. Other Peaters of a more poetic turn of mind composed a new and appropriate song, and for a time sweet (?) vocal music filled the log cabin to its rustic rafters. More Peaters again, and these of a military turn of mind, entertained those assembled to a gun drill in which sharp business-like commands in German alternated with the click of a military rifle as it was dexterously handled in a way military Peaters do these things.

Then a procession of all the guests was formed to visit this beautiful Saxonia Farm, not by electric light, nor by the light of Her Majesty, the Moon, but by the wavering light of dozens of peat bonfires placed in artistic disorder amongst the great trees bordering the way from the house to the fuel plant. Peaters know there is scarcely any use to which our black, unwieldy looking muck may not be put, and surely this was driven home when one watched one fire burn blue, another red, a third yellow, and so on throughout the colors of the rainbow. Against the dark background made by the foliage, with the shadowy forms of the Peaters moving about, with the unearthly complexions given by the colored flames, and with the smell of fire all about, it is small wonder that some of the Peaters were noticed to quiet down, and, perchance, mutter a prayer, that they might get the better of peat before peat got the better of them.

However, the orchestra taking the lead, the Peaters, with a number of ladies, undoubtedly interested in the Peaters, if not in peat, sedately formed in line and marched between these fearfully beautiful fires until a halt was called. The dampness of the ground prevented carrying out fully the programme here arranged, but two Peaters, more daring than the rest, gave a "Salad Dance," so called because it was made up of a little

bit of everything, smothered in a generous dressing of good humor, by the onlookers.

In the woods overlooking the plant, were sung a couple of hearty choruses in which everyone joined. The return to the cabin was made to the strains of a stirring march. Then delightful refreshments were served by the host, his wife and charming daughters, and a half hour was spent in undivided admiration for the man who had gotten together so many interesting curiosities as adorned the walls on every side, (no reference is intended to the assembled Peaters), and who was responsible for so pleasant a gathering.

After an interval, each Peater's face assumed a more serious aspect as he began to realize it was getting near the time when the secret rites must be performed. The host, after quietly giving the signal, led the way to another and secret apartment in his home, still more appropriately furnished for the curious ceremonies.

When all were assembled the Peaters' call was again minutely explained by the brother who originated it, so that none of the newly initiated might err in their work, when called upon, and during this recital an incident was noted that later became of grave import. The host among other valued and interesting possessions is the owner of a most intelligent dachshund, who responds to the imposing name of Pumppernickel. This animal showed such interest in the proceedings of the Peaters that he was then and there initiated and became an active member. Indeed such sagacity did the dog show that the brethern took it as a sign that good fortune would follow were he honored in some conspicuous way, and this was done later as the records of the secret conclaves will show. This time was deemed fitting for the annual recital for 1911, of the event decided upon the year previous in Ottawa and the story was again told with due ceremony.

Thus, the most serious ceremonial event of the evening having been accomplished, the Peaters again returned to the cozy comfort of the peat fire and of the ladies' company, and all too soon the alarm was given that the last car was soon due. A scurry was made for coats and hats. Hasty but none the less genuine appreciations of the evening's entertainments were spoken, a couple of old and appropriate good-bye songs were sung with zest, and the Peaters said farewell to Saxonia Farm and its delightful owners, and returned to the city.

Here the last secret session for 1911 had been carefully provided for through the forethought of one of our most beloved benefactors. As the Peaters marched from the car to the headquarters hotel, the time was usefully spent practicing calls

and signs. The password for the evening, "Number 202," was made known, and the Peaters quietly retired to their rooms, to stealthily appear again, groping along the corridors, past a red sentinel light bravely procured by one of the brethren from the city authorities, to that place known only to those in possession of the magic words "Two-O-Two," where, a signal being given, a door was partially opened, sign and countersign exchanged, and the Peater was permitted to pass into the cozy room prepared for the conclave.

The gathering was called to order. The ritual was gone through and the meeting declared open for new business. A resolution was almost immediately put and passed which was read over long distance phone to the host of the earlier evening. He was commanded to appear forthwith clothed in his own peculiar regalia, to occupy his important office in the assembly. This he agreed to do.

After much discussion, during which every brother was accorded three minutes to unburden himself, and some more loquacious brothers as much as six minutes, the time-worn name of Peaters was discarded in favor of the more euphonious name of "Pumpernickels." It was agreed that the sagacity of the dumb animal was a sure sign not to be overlooked. Further discussion was ended by adding the words, "Modern but Oriental Order" to the word already chosen, so that the name decided upon was "The Modern but Oriental Order of Pumpernickels." The definition of the word "oriental," given by one of the Pumpernickels, was deemed of sufficient merit to become one of the secrets of the order. Officials were appointed and their duties outlined. Forecasts for 1912 were indulged in, the loving cup was duly emptied and put away for next session and in the wee small hours silent figures might again be seen gliding past the red light to their rooms, all of them satisfied that membership in The Modern but Oriental Order of Pumpernickels was a goal worthy of many years' consistent worship at the shrine of our most refractory Goddess Peat.

And thus, many of us got to know his neighbor much better and to admire him and his plans, where before we feared or despised him. And some of us had our chart corrected to avoid shoals in our work, and all of us vowed to be present at the next convention to further the economic use of peat in its various forms and for its various purposes, and also, let it be put on record, to meet each other again.

POETRY.

Few of the members of the Society who attended the meeting at Kalamazoo, realized that so many kinds of talent were present in their midst. Inventive, mechanical and business ability were expected of all; some proved that they were almost orators; others were more than suspected of being humorous or gave demonstration of great ability to entertain with song and dance; still others had military knowledge and great command of language, but it was not apparent that a poet was among us.

That such was the case, however, is plainly shown by a little briquet of verses which found its way to the Editor's desk soon after the meeting, and which showed such an intimate and feeling knowledge of the happenings there, that the author surely must have participated in them.

This "Little Piece" so well expresses the spirit of the occasion that it is here published, without the knowledge or consent of its author, who will undoubtedly become famous thereby, and in spite of himself.—Editor.

CANADIAN PEAT SOCIETY.

J. McWILLIAM, M. D., ARTHUR J. FORWARD, B. A.,
President, London, Ont. Sec'y.-Treas, Ottawa, Ont.

Ottawa, Nov. 3, 1911.

Carl G. Kleinstueck, Esq., Kalamazoo, Mich.

Dear Mr. Kleinstueck:—The Burns family, as you are aware, have a high reputation in the field of poesy. The poetic fire, long smouldering, appears to have broken out recently in the newest member of the family, as evidenced by the enclosure I am sending you herewith. On perusing his effusion I observe that at some period of his career he must have become familiar with a well-known work of William Cowper. It also shows marked influence of Samuel Coleridge, Lewis Carroll, and other more or less widely read authors. So that the iniquity of its perpetration cannot be classed as original sin. Mr. Burns strongly assures me, however, that his intentions were honourable, and that his act was inspired by a genuine desire to express appreciation of the kindly welcome extended to the Peaters in the intimacy of your home, and a large measure of personal esteem for the man who was responsible for so pleasant an entertainment. Upon this understanding, therefore, and hoping the lines, though trivial, may afford some slight amuse-

ment to an idle hour, I have consented to send it to you, and in doing so I very heartily join in kindest regards to yourself and family.

Yours sincerely,
ARTHUR J. FORWARD, M. P. C.

A LITTLE PIECE.

Dedicated to Carl Kleinstueck.

(By Peat Burns.)

Carl Kleinstueck was a citizen
Of credit and renown:
A merry peater eke was he
Of famous Ka'zoo town.

Carl Kleinstueck's spouse said to her dear,
"Though peaters we have been
These many happy years, yet we
No brighter days have seen.

"Tomorrow is the meeting-day,
When peaters will repair
Unto the Court House in the green,
To give their hobbies air.

"It seems to me, if you agree,—
'Twill make the welcome warm—
'Twere well the peaters came at eve,
To view Saxonia Farm."

He soon replied: "I do admire
Of womankind but one,
And you are she, my dearest dear,
Therefore it shall be done."

The morning came, and man and maid
For peaters' pleasure wrought
The hearth with earthly blocks was heaped,
From near-by peat-bog brought.

For hours the honest toilers delved
The mysteries to learn
Of what peat is, and what it's for.
And how to make it burn.

When to their ears a welcome sound
Was borne by kindly Fate,
"Carl Kleinstueck wants you, peaters all,
At Saxonia at eight."

Anon from inn there sallied forth,
A group on pleasure bent,
Whose joyous air and freshened garb
Bespoke their glad intent.

Quoth one, "When we our hostess greet,
'Twere shame indeed to all,
If we bear not some token meet
To grace the festal hall."

They scarce had reached the starting-place,
Their journey to begin,
When, looking out, the florist saw
Some customers come in.

And very soon the customers
Were suited to their mind,—
"What better than the queenly rose,
Could mortal even find?"

"Good lack!" quoth one, "our genial host,
And shall it ever be,
That peaters should imbibe a toast,
And not remember he?"

"There is a plant of dainty green,
That's healthful to the mind,
Its graceful plumes wave far and wide,
Before, around, behind."

The merry crew went out in haste,
That peerless plant to trace,
Whose fame is spread through all the land,
That knows its favorite place.

So three blocks off the car was stayed,
Where they did all get in,
Nine peater souls, and all agog
To dash through thick and thin.

Clang, went the bell, round went the wheels,
Were never folks so glad,
And—safely past th' Asylum gates—
The party cheered like mad.

Warm greetings o'er, all felt delight
To share the hearty cheer;
The peat fire glowed upon the hearth,
The dachshund lying near.

The time sped fast in pleasant chat,
And other social joys,
Till Kleinstueck's voice was sudden heard
Above the mirthful noise.

"Oh! peaters, come and walk with us,
And peateresses, too—
The night is fine," the peaters said,
"Do you admire the view?"

(Now, Carroll, I regret to say,
Has played me here a trick—
The base aspersion he has cast
Upon that line, may stick.

The difference please bear in mind,—
'Tis easily described,—
On the return from Carroll's trip,
The oysters came inside.)

With foreheads bared they gladly walk
Beneath the flaming stars;
The friendly trees their pathway roof
With dark and shadowy bars.

Like Druids of the moorlands, they
Their ancient rites begin,—
"Die Wacht am Rhein" mounts to the skies,
Weird, warlock dancers spin.

With eerie gleam along the path,
The mystic altars glow,
The ardent worshippers of turf,
Fear now no deadly foe.

Once more within the cheerful room,
 They lightly jest again;
 With Owen's verse the rafters ring,
 They sing with might and main.

The trophies on the fire-lit walls,
 The many treasures rare,
 Are viewed with feelings of delight,
 Or handed 'round with care.

When sudden ring of stern command
 Sets every heart athrill;
 The peaters shout, while warriors twain
 Entrance them with their skill.

(And what was all the war about?
 Who vanquished? and who fell?—
 Why! 'twas a famous victory,
 But that I cannot tell.)

All good things to an end must come,
 For time creeps on apace;
 Its trot becomes a gallop soon,
 Of one who wins a race.

And so the loving-cup comes in,
 And toothsome dainties eke;
 The first farewells are close at hand,
 When one begins to speak.

It is a wight of serious mien,
 Carl Kleinstueck stoppeth he,—
 "By thy sad brow and baleful look
 Now wherefore stopp'st thou me?"

He holds him with his glittering eye,
 The chastened host stands still,
 And listens like a three years' child.—
 The peater hath his will.

Though Kleinstueck fears the stern behest,
 He cannot choose but hear,
 While thus speaks on that serious man,
 The ven'erable peatere.

"The time has come," the peater said,
 "To talk of many things;
 Of mull, and turf, and litter-moss,
 Banshees, and fairies' wings,
 And why peat bogs are boiling hot?
 And whether keys have rings?"

Without a word he leads the way,
 Nor feigns it grieves him sore,
 To secret subterranean cell,
 Far 'neath the mansion floor.

What in that mystic place was said
 Or sung? There rests no clue,
 With pallid brows and pensive mien
 Returned the peater crew.

Too soon the last good nights were said,
 And all returned to town,
 Nor stopped, till where they had got up
 They did again get down.

So let us sing, Long live peat king,
 And Kleinstueck, long live he,
 And when he next doth play the host,
 May I be there to see!

DR. WIELANDT'S PEAT MACHINE.

[During several years past there has been in practical operation at Elizabethfehn, in Oldenburg, Germany, a new and improved machine for the production of air-dried, machine peat, which was worked out on lines so different from any which had been in use before it, that it has been watched with the greatest interest. The inventor, Dr. W. Wielandt, very kindly furnished for the use of this Journal, not only a most interesting account of his invention, but he also loaned the cuts which illustrate it. The paper, of necessity, is somewhat technical in its nature, and the Editor is indebted to two of the members for the English translation from the original German.—Editor.]

While other inventors have been developing machinery for special operations in the process of preparing peat for fuel,

Dr. W. Wielandt has designed a peat digging machine which is absolutely automatic in its working, so that much less hand work is required than formerly, and by its use the production of peat fuel has been reduced to a half or a third of its previous cost.

This machine, which is protected in the United States by Patent No. 996,898, and in Canada by No. 126,536, consists of a uniformly forward-moving truck or car operated on a portable tramway of 600 mm. (23.6 inches) gauge; from the side of the car is suspended a chain and bucket dredge 3 to 5 meters (10 to 16.5 feet) long and about 1 meter (3.28 feet) wide. On the same car is mounted a double-screw macerating machine, to which the raw peat is fed through a hopper that receives the peat as it falls from the buckets of the excavator. The macerating machine is provided with a mouthpiece of pentagonal cross section, and an automatic cutter which cuts the peat into bricks of uniform length as it is forced from the outlet. Coupled to the frame of the machine and moving forward simultaneously with it, is a belt conveyor which receives the bricks as they are cut off from the peat strand issuing from the mouthpiece. The conveyor automatically drops or lays out the peat bricks upon the whole width of the drying field as soon as the band reaches the end of its travel. The drying field may be from 12 to 30 meters (about 40 to 100 feet) in width.

The machine can be modified in its details to suit the conditions of the bog on which it is to be operated. It can be operated by an electric motor or by a gasoline engine, which may be placed on the car or on a special, independent truck, so as to be usable as a locomotive to draw the dry, finished fuel from the drying field to storage sheds.

The standard machines will produce from 6 to 7 tons of air-dried peat bricks an hour, equivalent to about 40 or 50 cubic meters (52.3 to 65.4 cu. yds.) of raw material. The power required to operate the machinery is 20 horsepower. The cost in Germany for this type of machine, including the cutting device and brick conveyor, is from M. 12,000 to M. 14,000 (\$2,400 to \$2,800), which with duty of 47 per cent. and freight charges would make the cost, delivered in New York, from \$5,000 to \$5,200.

During 1911, three of these machines were in operation at Elisabethfehn, Oldenburg, the oldest one having been used for three summers, and, in the opinion of peat engineers who have tested them, they have shown the highest efficiency and economy.

This machine, when compared with others, has the fol-



Dr. Wielandt's Peat Machine in Operation---Rear View

lowing advantages: (1) Every individual process is absolutely automatic, so that only 2 or 3 workmen are required, as compared with 12 to 15 needed by older types of machines. (2) All movements of the machinery are continuous and uniform, hence its construction is simple and it is easy to operate. The utilization of the power is also uniform and in this way the wear and tear is reduced to a minimum.

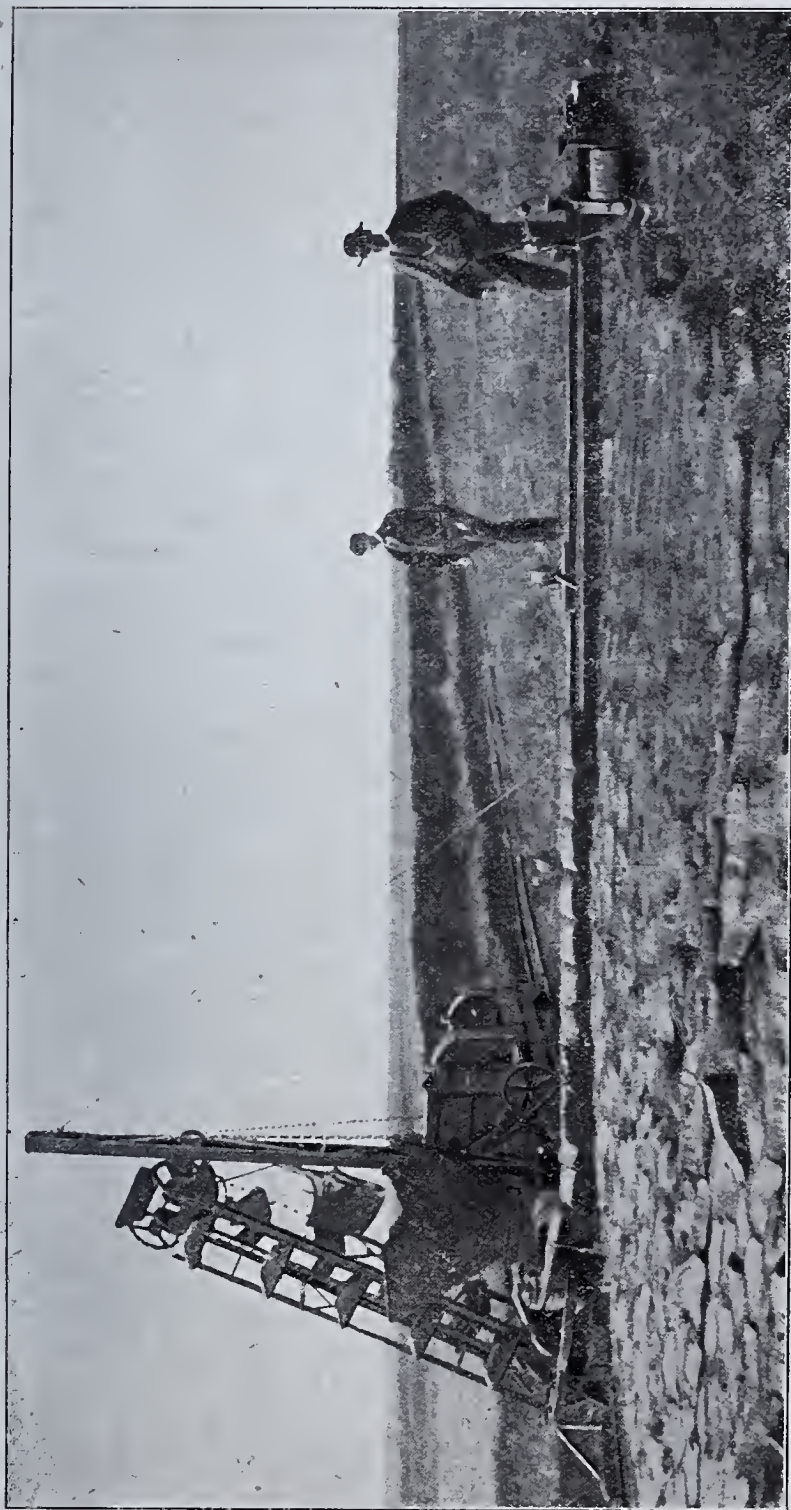
(3) As the dredging covers only the width of one meter (3 feet, 3.4 inches), only the drier material on the face of the cuts is worked. This drier material, as shown by experience, contains about 12 to 15 per cent. of dry substance, as compared with but 5 to 10 per cent. contained in the underlying material. In other words, the peat obtained in this way contains materially less water when dug and macerated, and dries faster afterwards, than that produced by the old style machines. These facts make possible more frequent use of the drying field and also a more extended drying campaign.

(4) The light weight of the machine, about 2,500 kilogrammes (5,500 pounds) and the production of a sloping cut or bank, instead of a perpendicular one, permits the working of either fresh, undrained bogs, or of those which have been cut up by cracks caused by too rapid drainage. As there is no necessity for supporting the outer dredging boom, it is possible to dig the lower layers of peat from below the surface of the water.

(5) The dredging boom can be lowered or raised while the work is going on, without stopping the machine. The boom has a wide range of movement, which makes it fit to any slope of cut and depth of opening desired. In other words, the machine can be adjusted to any bog condition desirable and can be made to avoid any obstructions in the cuts, such as sand hills or tree stumps, without loss of time. If it is desired to remove the machine from one ditch to the other, it is only necessary to raise the dredging rig and swing it parallel to the long axis of the machine, when it is out of the way. This arrangement makes it possible also to move the machine easily on any track, turntable, switch, etc., of a portable tramway, without dismantling the machine or any part of it; therefore, the time required for such changes is reduced to a minimum.

(6) The machine proper, together with the brick conveyor, can be moved for considerable distances without difficulty, as it travels on a standard gauge 600 millimeter portable track.

(7) The deposition of the peat bricks on the drying field in a horizontal position, and their pentagonal form, favors the



Dr. Weilandt's Peat Machine, Showing Laying-out System

free run-off of any rain water which may fall on them and this lengthens the campaign about 50 per cent., or from 6 to 8 weeks, because the water does not soak into them. The three of these machines at work in Elizabethfehn during 1911, were operated during September, under such conditions. Peat machines of all other makes in that part of Germany were closed down at the end of July. From 25 to 30 per cent. more production, in effect, is gained by its use, from the fact that the time needed for moving and swinging this machine is reduced to a minimum, whereas, by the old systems, out of a possible 100 working days, only 60 to 70 could be utilized, as the rest were taken up in moving the machinery.

(8) The machine can be worked day and night, with electric light, so that the daily number of working hours can be increased to 20 instead of being limited to 10 or 12, as manual labor is practically excluded.

(9) As the buckets of the dredge work all depths of the bog simultaneously, a thorough mixing of the raw material is obtained and the result is a more uniform and even-textured product than that made by other styles of machines.

The cost of operation is as follows: A production of 6 tons of dry peat an hour, 15 hours a day, for 100 consecutive working days, is assumed; $6 \times 15 \times 100 = 9,000$ tons of air-dried peat for each machine for a working season. Three workmen to each machine at 8 marks (\$1.60) a day each = 24 marks

	Marks	Cents
(\$4.80), or for a ton of air-dried fuel.....	0.26	5.2
Power required, 15 to 18 H. P. or daily about 200 Kilowatt hours = 22 marks, or (\$4.40) amount-		
ing for each ton of air-dried peat.....	0.24	4.8
Drying the bricks on a large scale, per ton, about.....	0.70	14.0
Materials and repairs, about.....	0.20	4.0
Supervision	0.20	4.0
Transportation of raw material for each 3 or 4 k. m.	0.40	8.0
Depreciation of 20 per cent. on machine and track.	0.50	10.0
	<hr/> 2.24	<hr/> 44.8

or under 2.50 marks (50 cents) per ton of air-dried peat at the factory. This amount can be reduced if work is done day and night.

THE RECENT DEVELOPMENT OF PEAT AS A POWER FACTOR.

Dr. T. A. Mighill, Boston, Mass.

So new is the use of peat as a fuel for power purposes, that the whole development of the industry has taken place in less than a decade, and the greater part of it in less than five years. With this introduction, and no apology on account of the title, I propose, in this paper, to state what has been accomplished from what information I have been able to obtain.

Peat has been burned under boilers, distilled in retorts, and gasified in producers. It has been used as dried turfs, machined blocks, briquettes, and dust. It has been used with a content of water varying from 10 per cent. to 60 per cent. The countries of Sweden, Germany and Great Britain have taken the lead in the development of peat power. As early as 1872 peat was gasified for metallurgical purposes at the Mol-tala Iron Works in Sweden. In 1903 a small plant was erected at Skabersjö for power purposes. The Körting machinery was installed and the capacity of the plant was about 300 h. p. A 60 h. p. plant was erected at Burangsberg. In 1907 one of 1,000 h. p. was projected at Wisby and a smaller one at Sunne. In 1909 Consul Murphy reported the erection of a central power station at Svedala to supply electricity to neighboring towns.

In 1909 the Swedish Railways experimented on the possibilities of peat as a fuel for locomotives. Trains of about fifty cars were run twice daily and 140 trips were made. The cost of prepared peat was reported to be \$1.84 per ton. However, the managers were not convinced of the practicability of using peat fuel and the director ordered the tests discontinued.

One of the latest developments in Sweden is the preparation of peat powder as a fuel. An experimental plant was established at Bäck. The peat was machined, formed into bricks and air-dried, then crushed between rollers provided with toothed rings, further crushed between discs provided with iron pegs and then bolted and dried. 1.2—1.4 tons of this powder are reported to be equal to one ton of coal. The cost per ton as fired was nearly equal to the cost of coal as evinced by the trials, as some coal had to be used, the ratio being as \$3.25 to \$3.95. Dr. Ekelund has a process of preparing peat powder. The details are not yet available. It is said that he air-dries the peat, then lets it be exposed over winter. It is thereby more easily pulverized and less hygroscopic.

Russia is a great peat country. In central Russia in 1908 there were seventy-three firms making peat fuel with a total of 960,000 tons, according to Consul De Soto. The average cost was \$1.40 not delivered. Notwithstanding, no noteworthy development of the use of peat as a source of power has taken place.

Ireland has been noted for its peat deposits, peat having been dug there for household purposes for unknown years. The development of the power proposition, however, has not been very great. In 1909 the Dublin and Central Ireland Power Co. applied to Parliament for a charter to supply the counties near Dublin with electric power generated from peat fuel. They proposed to build a plant about twenty-seven miles from Dublin in Kildare Co. and to furnish 15,000 H. P. for fifty years. The process of Ziegler was to be used. I understand that much money was spent without practical results.

At Carnlough, Woltereck erected a plant to demonstrate his process of making ammonia by running air over heated moist peat. According to the inventor more nitrogen was fixed as ammonia than was contained in the peat. His claim has been strenuously combatted by others. However, I do not understand that he intended to furnish power by his process. Last year Consul Culver reported discouragingly on the peat industry of Ireland, numerous plants being idle.

In England The Power Gas Co., the promoters of the Mond system of making producer gas, with the recovery of ammonia as a by-product, tried peat in their producer. In 1908 Dr. Caro, experimenting at the Mond Works at Soddington, gave the impetus to a most important development of the peat power problem.

In the Mond producer coal is gasified with an excess of steam at a low temperature. The nitrogen contained in the coal is nearly all fixed as ammonia which is subsequently recovered as ammonium sulphate. Dr. Caro found if peat be used as a fuel with some 50 per cent. of moisture, that by heating the air blast to 350°-550° C. almost all of the nitrogen in the peat could be fixed as ammonia.

In co-operation with Dr. Frank he had earlier developed the fixation of atmospheric nitrogen through the formation of calcium cyanamide. Together they worked out the process of fixing the nitrogen of peat in the Mond producer.

In 1897 Dr. Frank proposed the utilization of the peat bogs of Germany as a source of fuel for steam raising purposes. He proposed erecting central electric stations at the bogs which would furnish the current to neighboring towns. In 1903 he recommended the gasification of peat in producers,

whereby twice as much power could be obtained from a given amount of peat fuel. In 1908 Caro advocated the same procedure for Eastern Prussia.

In 1905-1906, the Mond Co. experimented with Irish peat at Stockton and with Italian peat at Winnington. The Irish peat contained 1 per cent. nitrogen, the Italian peat 1.6 per cent. nitrogen. From the latter peat they were able to recover 120 lbs. ammonium sulphate and something over 60,000 cu. ft. of gas with heat value of 152 B. t. u. per cu. ft. from a ton of dry peat. The development of the process was now carried on in Germany with Dr. Caro at the plant of the Mt. Cenis coal mine at Soddington, Westphalia. Peat was furnished by the government and two different lots were experimented on, as much as forty tons per day being gasified. One ton of dry peat yielded over 89,000 cu. ft. of gas, with a calorific value of 158 B. t. u. per cu. ft. The plant, however, was designed to be operated on coal mine refuse and has been chiefly run on this class of fuel.

Further data on the process and character of the gas need not be given here as they are easily available. Dr. Caro has recently said if the peat contain 50-60 per cent. moisture that the yield of ammonia is greater and most all of the nitrogen in the peat is fixed, whereas if the straight Mond process is used it is more efficient to use much drier peat. Dr. Nieber reports that he was informed by Dr. Caro, that if the peat contained 1.25 per cent. nitrogen, the combined cost of preparing the fuel and gasification is covered by the sale of the ammonia and that the gas is obtained free. Further, if the nitrogen in the peat is from 2 to 2.5 per cent., that the cost of generating electric power is nothing. He has elsewhere shown that when peat is coked much of the nitrogen is retained in the coke, thus advocating the worth of his process. Dr. Caro's claims have been attacked by the Power Gas Co., giving the credit of the use of peat as a fuel in a producer with recovery of ammonia to Dr. Mond.

As a result of the experiments in England, several plants were projected in Italy and Germany. The Italian plant was erected near Pontedera and the promoters claim very satisfactory results. It was examined by some French engineers who reported that all of the claims of those who erected the plant were met.

A plant was erected in Germany near Osnabrück, which has hardly been proved out as yet.

It is in Germany that the greatest development of the use of peat as a source of power is taking place. This is probably due to the long experience of the Germans in making peat fuel.

and to the encouragement given by the Government to cultivate the waste bog lands in the empire. Most of the bogs are owned by private parties, but some are still public property. There is an association with over a thousand members called the Verein zur Forderung der Moorkultur im Deutschen Reiche, which devotes its attention to the reclamation of bog land. They publish a magazine now in its twenty-ninth year.

The yearly production of peat in Germany is very large. Consul Teichman reports, this spring, an annual production of 11,023,120 tons.

To encourage the colonization of these bogs, it is proposed to erect central power stations which will consume the peat taken off the land as it is improved and in turn supply electrical power to the settlers and surrounding towns.

Two such plants have been erected so far, one near Osnabrück, and one near Aurich. These plants have been financed by private parties. The first thing to be done in these settlements is to dig canals to drain the bog. The peat which is removed is used as fuel in the central station and so far has constituted practically the entire supply. The central station supplies power to operate the dredging machinery. Fuel is transported by trains pulled by a gasoline locomotive. Agricultural machinery has been developed which is operated by electrical power, and it is expected that the colonists will avail themselves of the power close at hand and do their farming with machinery.

The central station near Aurich is the farthest advanced. It was erected by the Siemens Schuckert Co. It is a steam plant provided with turbine engines. Dr. Kamm, Ober-Regierungsrat at Berlin, gives the following information. The total horsepower of the plant is 6,000; at present only 2,500 horsepower are available. The current is sent as far as Wilhelms-haven on one side and to Emden on the other. In 1910, 2,870 carloads of peat fuel were burned together with some coal, as the supply of peat was inadequate, but in the last five months only peat fuel was used. Six million K. W. H.s have been supplied to consumers and day and night 900 K. W. H.s to the harbor works for pumping; 6.6 lbs. of peat fuel were consumed per K. W. H., but it is expected to reduce this to 5.5 lbs. The total power developed last year was 8,000,000 K. W. H.s. Should this consumption be tripled, as seems likely, there is sufficient peat fuel available to supply the central station for 700 years.

The plant near Osnabrück was erected by the German Mond Gas Co. Its capacity is 1400 K. W. The peat fuel is gasified according to the Mond process with recovery of am-

monia. The plant is now in the testing stage, and should it prove more successful than the plant near Aurich, it is proposed to erect the same kind of a plant there.

The cost of the plant is greater than the cost of a same size steam plant, and Dr. Kamm says it consumes more fuel per K. W. H. This is offset by the value of the ammonium sulphate recovered which brings \$65.00 per ton. However, should the synthetical process of making ammonia now being developed prove successful, the whole business would be on another basis.

A year ago the Görlitz Machine Co. erected a 500 H. P. plant at Jekaterinburg, Russia, in a mill. It has run day and night and consumes 1.98 to 3 lbs. of peat fuel per h. p. h., according to the moisture content of the peat. The producers are double walled preheating the blast. The draft is divided but mostly downward. Much of the water evaporated is blown off as steam through a purging stack.

Ziegler, the inventor of the coking process, has also invented a producer for peat. A plant was erected at Schelecken using his process. It was of small size and ran an 80 h. p. engine. Afterwards the gas was used for a steel furnace. The Ziegler coking process was not intended primarily for power purposes, as the gas was used to heat the retorts. This process has not been very successful financially, the Bavarian works having been liquidated. Dr. Heber says Dr. Ziegler informed him that the cost of the peat fuel and the cost of purifying the tar and tar water were excessive, prohibiting commercial success. Lately Dr. Ziegler, now with a Russian concern, has perfected a Dewaterer for peat of which details are not published, which may change the situation. The peat is pumped through a filter cell narrowed at the bottom, so that the water is pressed from a thin layer of peat. He claims to reduce the water in the peat from 90 to 70 per cent. Three other coking processes are also reported.

Other plants which have been reported are one at the Solingen mines, Westphalia, to furnish power, and one in Schleswig-Holstein, erected by the Körtings, as a central power station.

A novel process of generating power from peat was invented by Gercke. The peat is heated in a boiler. The evaporated steam is used to drive a steam engine. This was tried out practically but was abandoned for an ordinary boiler. There seems to be a sharp rivalry between the promoters of the suction producer and the promoters of the by-products recovery producer. One writer representing the Görlitz people has claimed greater efficiency for the suction producer, using the

power to fix the nitrogen of the air as calcium cyanamide. Dr. Caro objects to this, claiming a misunderstanding of figures, that the Mond process gives ammonia directly, and that the other process demands the previous preparation of calcium carbide.' Moreover, the ammonia in the form of sulphate, is immediately available, which is not the case with cyanamide. However, the Mond process does not apply to plants with less than 1,000 h. p. Which side has the better argument is not yet clear, and it may be said that in 1904 Dr. Frank advocated the use of peat fuel to make carbide. According to Dr. Kamm, from whom I have drawn information about the central stations in Germany, it is not yet settled which is most profitable, direct firing of peat under boilers, burning it in suction producers, or burning it with recovery of ammonia.

Consul Teichman reports, this spring, that there has not as yet been in Germany a satisfactory solution of the problem of making gas more cheaply from peat than from coal.

Other concerns making peat producers in Europe are, the Julius Pintsch Co., G. Luther, Braunschweig, and the Compagnie de Gas at Paris.

In America there has been no advance beyond the experimental stage, in using peat as a source of power. Some peat fuel manufacturers have fired their boilers with peat but only in a small way. The U. S. Geological Survey has made some tests with peat fuel and the Canadian Government has a peat plant at Alfred and a producer plant with engine and generator at Ottawa.

Reports of this work are to be found in the bulletins issued by the respective governments.

Outside of these trials, several private concerns have built producers adapted to peat fuel and made experimental runs. One of the best of these runs was by the Gibbs Gas Engine Co., at Jacksonville, Florida.

In 1907, a company was formed in New York to make peat fuel and furnish power in Mexico. The plant was to be erected the next year. I have not learned the fate of the project. Col. Astor made a producer which ran a 150 h. p. engine operating a stone crusher. No figures are available.

One of the latest, but untried projects, is being exploited in Boston. The plan is to burn peat in a producer capable of withstanding some 200 lbs. pressure. It is claimed wet peat can be used. The steam generated is to be used to drive a steam engine. After the condensation of the steam the gas is to be used to drive a gas engine. The promoters do not seem to have figured much on the heat equation, fouling of the en-

gine through tar, or the requirements of a varying load, as occurs in street railway service.

A most welcome proposition is that of the Power Gas Co. to erect a power and demonstration plant in this country. They favor Florida as a location. Their representative was here this spring looking over the situation. I spent a day with this gentleman and was much impressed with his confidence in the success of the Mond process.

In conclusion, my opinion of the peat power proposition is that the solution of the matter lies with the peat fuel manufacturer. Until peat fuel can be made more cheaply, and in larger quantities than at present, we are not likely in America to see many peat power plants. The peat fuel manufacturer must get a more comprehensive idea of the large amount of fuel to be supplied, and that supply maintained through winter as well as through summer, and of the large drying surface required to air-dry the necessary amount of peat, even with 50 per cent. of moisture in the product.

The situation in the German peat colonies is almost ideal. The farmers want to get rid of the peat. They have a market at their door as well. From the central station comes the power they need to develop their land and also ammonium sulphate and ashes as fertilizer. We are not yet compelled to move to the bog for a home and we want higher pay for our labor. I believe, as I maintained last year, that the solution of the peat power problem will come in this country only with the introduction of machinery to manufacture the fuel, to dig, spread, and harvest it. I have reason to believe that this will be done both from what I have seen in the work of others and what has been accomplished at our own experimental plant.

Fuel from Nile Sudd. The possibility of the utilization for fuel of "sudd," a compact, peaty mass of water plants which has for years been a menace to Nile navigation south of Khartoum, was an important discovery of the past year. An Anglo-German syndicate has been formed and a factory built to convert "sudd" into fuel briquets. Should the experiment be thoroughly successful, as now seems evident, it is expected that the irrigation service, the White Nile steamers, and perhaps the Sudan Government railway will use "sudd" briquets instead of coal. The price per ton of sudd briquets will be about \$3.75, while British coal at Khartoum costs \$12.50 per ton. The capacity of the sudd factory will be approximately 40,000 to 50,000 tons a year.

PEAT IN AGRICULTURE.

Paul H. Todd, Kalamazoo, Mich.

After a careful examination by the United States Department of Agriculture, it was estimated that the swamp lands in the States east of the Rockies and capable of practical drainage comprised not less than 77,000,000 acres. That is to say, they would, if populated like Holland, whose soil they excel, support a population equal to more than half of the present population of the whole United States. In other words, we have in our midst an undeveloped empire equal in extent to the British Isles, which could be divided into nearly two million 40-acre farms of great fertility, each capable of supporting a large family. These are remarkable and very important facts and are realized by very few Americans. Our idea of a farm is generally an upland section of clay or sandy loam, growing fruit, grain, potatoes, etc., and raising any or all kinds of livestock. Few of us realize that the black bogs or swamps that are covered with dense vegetation and yet are so miry as to be impassable through most of the year; that are the breeding places for mosquitoes and for malaria, can be converted by dredging streams or digging canals into the most valuable of all our farm lands, into lands which will produce the largest and most valuable crops, and which will sell at the highest prices per acre.

The practical man, who is more interested in results than in scientific considerations, will be convinced of the truth of these last statements when he knows that almost our entire supply of onions and celery, cabbage and other truck is obtained from these cleared and drained swamps, and that the profits in these crops, when they are well raised and marketed with judgment are usually not less than about a hundred dollars per acre and are often much more. In the big celery and onion-producing districts of New York State this land is commonly sold for more than \$500.00 per acre.

To the man who appreciates the more or less scientific aspect of the value of peat lands, however, a brief consideration of the manner of their origin will doubtless be of interest, as from such a consideration we see that the very origin of our peat soils has been through their being veritable storage heaps of plant food. Our peat bogs are in some cases low sections of country which receive the drainage from large areas of upland and during dry seasons dispose of this overflow or seepage by means of underground channels or small surface streams. Others are due to the obstruction of natural water ways by beaver dams which have flooded large areas that

swamps now cover. Through many preceding centuries this drainage water has collected, rich in plant foods carried down in solution from neighboring uplands. These dissolved plant foods have supported the growth of certain mosses and some other forms of vegetation which have at length died and partially decomposed, and the remains of their tissues have gradually collected until they have formed the present purely organic deposits that constitute our peat lands. Thus it is that peat lands are treasure areas of plant food and this is why they are so extremely and remarkably fertile.

Of all the operations on which the cultivation of peat lands depends, proper drainage is the most important. To be sure it is impossible, where there is a thick growth of trees and shrubs, to commence raising crops until this is cleared off, but even clearing has to follow the drainage of the land.

For draining peat lands two general systems are in use. The most common method is to dredge out the stream, if there is one, which carries off the surplus water in the wet season. Where there is a dense growth of vegetation along the banks, it is usually most convenient, if the job is a reasonably big one, to use a steam shovel dredge, which is always floated on a plank boat riding in the water where it has excavated, so that there is nothing to obstruct its forward progress as the dredging moves ahead. Where there is no heavy growth of timber or shrubs and the banks are level, it is often preferable to use a different type of machine, a type having digging buckets that travel back and forth along a trussed frame called a templet. This machine travels along the banks of the stream on what is called an apron traction, that is, it has long, broad, endless belts in the place of wheels, these belts being made of large wooden slats held together by sprocket chains, which run on cog-wheels geared to the steam engine inside the machine. These apron tractions afford much larger and more adequate bearing surface than could be obtained with wheels. At the rear of the machine and extending from bank to bank across the stream is the large trussed steel frame called the templet, and the excavating is done with steel buckets having knife edges and traveling along the bottom of this templet, which is curved according to the cross-section of the desired canal. The buckets dig each time they pass across the bottom of the templet, and are automatically dumped at the ends of it. When this machine can be used, it is possible to obtain a very much better job than can be obtained with the common form of dredge, because the canal will have smooth sides which will allow the water to flow with much less friction and much less crumbling effect; the sides will also have a better slant and

will be much less liable to cave in in places; and because it is possible to have the drain absolutely uniform in cross-section and absolutely according to the desired grade; and lastly, because the dirt removed is piled in a uniform pile sufficiently far back from the edges of the canal so that torrential rains will not wash it in again. These machines are built for all sizes of drains up to seventy-five feet in width. In sections where the streams are crossed by frequent bridges it is usually necessary to do the dredging with horses and scrapers.

The other system of drainage, which consists in the construction of dikes and the installation of large pumping stations, is used in districts which, like a large part of the territory of Holland, are below the common water level of the surrounding country. Though expensive, this method is often highly profitable in the end. But it is not practical except where there is a clay sub-soil which when excavated and piled up will make a wall that will be impervious to water. A 10,000 acre farm near Saginaw, Mich., has been drained in this way, the dikes having been built with steam dredges floating in the water where the earth was taken out for making the dikes. Several large pumping stations have been established at different points along the dikes, by means of which the water in the canals and the ditches inside the dikes is kept at a proper level. These pumps lift the water over the dikes in the spring almost as fast as seepage, rains, and the melting of snows combined cause it to collect.

After the flooded or marshy lands are drained properly, the next step is to prepare the soil for crops. Where there is a heavy growth of timber it is necessary to invest a large amount of money in cutting this off, pulling stumps, and removing brush. The cost of these operations is often \$20.00 to \$40.00 per acre, when properly done. The use of fires should be so limited as to not cause serious destruction of the humus, or dark, gummy constituent of the soil, on which plants depend for their supplies of available plant food, and which is decomposed by heat. The brush should first be cut with brush scythes and the coarse pieces gathered into brush piles for burning. Then the timber is felled and the logs and fire wood removed, and the waste pieces are gathered into piles.

The stumps are then cut around so as to loosen them, and pulled and piled. These piles should never be burned when the ground is dry, as there is danger of burning great holes in the ground, which will seriously hamper the subsequent cultivation of crops. In the past much clearing has been done by simply setting fire to the dried marshes and letting them burn for weeks or months or a whole season. But this cheap method

of clearing takes off one or two feet or more of the top layer of soil, as it is so easily burned when dry, and in destroying this layer, the cream of the whole soil is lost, for after a soil has lain undisturbed for ages, as it has in a marsh, it is only in the top portion where the air filters in, that the proper chemical conditions for feeding plants exist. The clearing left by burning is, moreover, very uneven, as the fire frequently follows the roots of stumps deep into the ground, making bad holes. Where dikes have to be built to make drainage possible, the land has in most cases been so wet that no vegetation other than reeds and grasses has been able to grow, so that plowing with a sod or breaker bottom may be commenced at once after drainage is perfected. So, though the cost of drainage has been much greater, the heavy expense of clearing is avoided.

We have now considered the general importance of our peat lands from the agricultural standpoint, and also methods of draining, and, in a brief way, of clearing. In this condition, i. e., ready for the plow, the parties who make a business of the reclamation of wet lands, divide them into small farms and turn them over to the truck farmers. For the benefit, however, of those who are interested in the cultivation itself, something might be said of the best principles and methods of conducting a peat farm, and, in this connection, a slight reference to the botanical side of agriculture might be of advantage.

The chief processes of plant life that are carried on in conjunction with their outside environment, are, as with animals, four in number, i. e., they breathe, feed, drink and excrete certain waste products, which are injurious, if not removed or so acted upon by purifying agents as to be made harmless. Drainage, plowing, cultivation, fertilizing, and rotation of crops are in general the important methods of favoring these processes on which plant life depends.

Because plants, unlike animals, have no internal breathing organs, the ordinary observer would hardly suspect that breathing fresh air plays such an important part in the economy of plant life as it does. As a matter of fact, it is absolutely necessary for plants to have plenty of oxygen around both foliage and roots. We know that plants give off oxygen in the process of manufacturing starch. But a certain amount of the oxygen of the air is continually being taken in again by the external cells to afford the same purification that is produced by the lungs of animals. Thus at night, when there is no longer any light, which is necessary for the manufacture of starch plants cease to give off oxygen, but instead give off carbonic-acid gas and breathe in only oxygen. Of course foliage breath-

ing is incapable of influence by methods of cultivation. But the root breathing, on the contrary, can be very greatly improved by good methods or greatly impaired by poor ones. As there is no light in the ground, so that no starch can be manufactured, the only functions of the breathing of roots are to absorb oxygen and give off carbonic acid gas. Now this airing of the soil, so that the roots of the crops can secure oxygen and get rid of the waste gas or gases produced by them, is accomplished by plowing, harrowing, and cultivating. The plowing tosses the earth over, putting aired earth underneath and giving the earth that was underneath a chance to air. Harrowing pulverizes the lumps, and cultivation, by frequent stirring facilitates the escape of waste gases and mixes fresh air with the soil. The deeper the plowing, the deeper will be the layer of aired earth, and consequently more roots will go deep into the soil. Cultivation should of course be shallow, so as to disturb the fewest roots necessary in order to allow the formation of a good dry mulch or shallow layer of very loose soil on top. The importance of having the soil in a well aired condition is easily seen in actual results in the fields, both in appearance and in yield. It is chiefly because the air is excluded by water that some crops die so quickly where the ground is excessively wet. Certain soils, especially clay, will fail to give good results because of lack of air, if they are travelled over or worked when very wet, as from this cause they are packed solid, the pores, or little channels among the soil particles being destroyed. Muck or peat land is not of this character, however, being naturally very porous, but the illustration simply shows how essential air is to the plants and how beneficial good drainage, deep plowing and thorough, shallow cultivation will be in general, in the agricultural manipulation of peat lands. It is probably more to allow this plant breathing than for any other reason that the matter of drainage occupies such a very important place in muck farming.

As to properly supplying muck crops with water, it would naturally seem at first thought that this should not be an important problem, as they are naturally well supplied with water, the water problems being rather concerned with the removal than with holding water, or irrigating. But yet the watering of crops is another very important result that has to be obtained by efficient drainage and proper handling of the soil. The importance of drainage for airing the soil has just been discussed. Strange as it may seem, however, it is necessary to have a marsh well drained simply in order that the plants may not, during part of their growth, suffer for lack of water, and this is for the following reason: Beginning about the

middle of July, and especially in the North Central States, there is generally a quite severe drouth for the rest of the summer. This drouth comes on quite suddenly. Where the ground is very wet during the period of high water in the streams, that is, during the rainy season, the crops root only in the air-dried layer of surface soil, for beneath that the air is excluded and the soil is unhealthful; the result of this tendency is the development of a shallow root system. Later, when the drouth suddenly comes on, the water table drops quickly, and the plant is unable to continue to obtain sufficient water because its root system is not deep enough. And so it is always where the marshes have been excessively wet in spring that the crops suffer quickest from drouth in summer.

So much for the effect of deep drainage on water supply. Plowing and cultivation are also important means of maintaining the proper moisture. When the land is plowed deep it soaks up the heavy rains more easily, hindering washing of the soil, with attendant harm to crops. Cultivation, by maintaining a dry mulch of loose soil on the top of the ground, retards evaporation of soil moisture. In addition to these considerations, one of the most important factors that enables muck soil, as well as other soils to hold moisture and to convey it up from below, is the humus content. Continued cultivation will, in a few years, so greatly reduce the supply of humus, even in muck soils, that their productivity will be greatly lessened if new humus is not supplied. Plowing under sods, the addition of stable manure, and the plowing under of green crops, are methods of maintaining the supply of humus, or soluble organic matter, in the soil.

Now, turning to consider the feeding of plants, an unlimited amount might be said on that subject. Upland soils are often spoken of as decomposed rock, but they are rather mixtures of minute fragments of undecomposed rock, for when examined under the microscope we find the same minerals that are found in rock beds. Because of the power which small particles have for holding moisture, these small particles are continually surrounded by a film of water which is constantly dissolving portions of them, so that solutions of substances constituting the food parts of the soil, namely, compounds of phosphorus, nitrogen, potassium, lime, magnesium, silicon, iron, sodium, and chlorine, are being continually supplied, these compounds all being sufficiently soluble to enable the plants to get necessary food. Muck soils, however, contain no rock, but they do contain an abundant supply of nearly everything except potash, since they have been fed for centuries on plant food solutions from uplands. The deficiency of potash is said

to be due to the fact that this element does not form such insoluble compounds with organic matter as other plant food elements, and consequently most of it has leached away. For this reason commercial salts of potash are extensively used on muck lands. In general, a piece of muck, like a piece of upland, should be so fertilized yearly as to maintain the original supply of humus and the original chemical fertility, that is, we should each year return as much of the essential plant food elements as the crops removed. For instance, we should apply 72 pounds of potash, which is equivalent to about 150 pounds of the commercial muriate of potash, to return what is removed by an acre of onions, when the yield has been 800 bushels per acre; about 300 pounds of muriate of potash, after removing a crop of sugar beets yielding 15 tons per acre, etc. Extensive literature regarding the use of manures and fertilizers is furnished for almost nothing by the Department of Agriculture.

We have lastly now to consider the importance of maintaining a perfect sanitary condition in the soil. Most interesting investigations are being conducted in this connection at the present time. But some important truths regarding it are well known. Among these is the fact that crops leave in the soil certain waste products that are often poisonous to the crops that produced them, so that the soil, after a greater or less number of years of continued planting to the same crop, will become unproductive for that crop, even though chemical analysis of the soil shows it to contain plenty of plant food. Some famous experiments of two English investigators, Lawes and Gilbert, illustrated this fact very plainly. They raised potatoes steadily on the same piece of ground for fifteen years and at the end of that time were unable to longer raise potatoes. Then without the addition of any fertilizer they planted barley and obtained a yield at the rate of seventy-five bushels to the acre. This showed that the excretions of potatoes, that were harmful to potatoes, were not harmful to barley. Many other illustrations of the poisonous effect of these plant excretions are easily found. Often the excretions of one plant are harmful to another. An instance of this is the inability of corn to grow around the roots of trees. This is not due to lack of fertility or moisture, as is often supposed, but simply to poison in the ground. The growth of feeding roots is so designed as to avoid at any time the poison that is being produced at the same time by the rest of the plant; roots of a plant are continually extending into new territory and absorb plant food and water for only a small fraction of an inch from the tip. As the tip moves forward, the portion left behind immediately corks over

and becomes impervious to moisture. There usually is not enough circulation of water to distribute through the soil in a single season, the poison produced in that season. So the roots avoid the fresh poison or toxin and it is probably only the accumulation of previous years that does the injury. It is believed by many that the removal or neutralization of these poisonous toxins is the most important result that has to be obtained in the restoration of apparently "worn out" soils. This renovation is accomplished by two means—by rotation of crops, with proper drainage, plowing and cultivation, and by keeping an abundant supply of humus in the soil, for humus seems to have a great capacity for breaking down these poisons and making them harmless. It is for these sanitary reasons that crop rotation is so fundamentally necessary on all soils, and where muck farming is conducted on a large scale, no economy of hauling crops at harvest time or of working the soils, should be allowed to interfere with systematic rotation of crops.

Production of Peat Fertilizer Material in the United States in 1910. Chemiker Zeit'g., 35 (1911) 1400. Abstract from U. S. G. S., "Peat Production in 1910." (The translation of the item is given in full, as it is the first time, to the writer's knowledge, that a foreign technical journal has noticed our "infant industry."—Editor.)

In the United States of America there were produced in the year 1910, 37,024 short tons (of 907.2 k. g.) of peat fertilizer, valued at \$140,209, as compared with about 26,768 tons, valued at \$118,850, in the year 1909. There was received for this an average price, at the plant, of \$3.79, as compared with \$4.44 per ton. The material is sold on the market in two grades, (1) "sun-dried" with higher water content, and (2) "kiln-dried," or "bone dry," that is, artificially dried, so that the water content does not exceed 10 per cent. The basis of the contract price for the last type is the percentage of combined nitrogen, reckoned as ammonia, and the prices are quite variable. For the current year they ranged between \$3.50 and \$6.00, the average being \$4.60 a ton. The decrease of the average price of last year (1909) is explained in part by a larger production of the "sun-dried" article, for which a lower price was received. In California and Massachusetts one new small plant was opened. The artificial drying is accompanied by too large heat losses; these are explained by the small size of the drying kilns, the injudicious design of which makes possible a large escape of heat.

—C. A. D.

SOME REMARKS TO PROF. LIPMAN'S 1909 REPORT ON THE AVAILABILITY OF NITROGEN IN PEAT.

By Herbert Philipp, Perth Amboy, N. J

In the 1909 Report of the Soil Chemist and Bacteriologist of the New Jersey Agricultural College Experiment Station, Prof. Jacob G. Lipman has taken up the subject of the "Availability of Nitrogen in Peat for Agricultural Purposes."

The members of this Society, who have had practical agricultural experience with peat, will be astonished at some of the sweeping assertions made in this report, as well as the short-sighted way in which Prof. Lipman has carried out his tests. In fact, several of our members, who have seen this report, which came into circulation this year, called my attention to it and at their urgent request I decided to make a few critical remarks on the same.

There is no intention here of depreciating the value and good work done by the Agricultural Experiment Station, and Prof. Lipman has undoubtedly carried his work out in good faith, but has made too hasty conclusions which have innocently injured a legitimate, flourishing industry in New Jersey, where there is a large amount of money invested in plants and approximately \$50,000 a year is paid out to labor employed on these deposits.

Prof. Lipman bases his assertions on a single set of tests (p. 192), made by growing a few grains of rye in small tarred pots for a short period; comparing the growth with that produced by nitrate of soda, a water soluble, fully-nitrified inorganic salt.

In the first place, Prof. Lipman has been very unfortunate in choosing rye as a plant to test the peat humus with, because rye does not do well in a humus-rich soil and it would seem that rye is about the last plant one would select for determining the value of organic matter. Again Prof. Lipman has robbed the peat of one of its inherent advantages by using tarred pots as one of the greatest advantages of using peat humus, lies in its ability to give free aeration to the soil, thus creating proper conditions for bacteriological action and also for the nitrification and ammonification of the peat humus. The great authority Hilgard, in his book entitled *Soils*, page 125, refers to the porosity of humus, and states that the humus becomes highly absorbent of water and gases, but it also gradually oxidizes, probably under the action of bacteria, which is an essential feature in its fertilizing effect.

It is hardly fair to compare peat humus with inorganic fully nitrified salts, which do not belong to this class of fer-

tilizers. Peat should be compared with recognized organic fertilizing materials, as bone meal, blood, etc. It is interesting to note here some results published on field experiments with cotton (Report of the North Carolina Experiment Station, 1907):

- Plot 1. Unfertilized; yield, 670 lbs. seed cotton.
- Plot 2. 200 lbs. acid phosphate
150 lbs. manure salt
350 lbs. humus (containing 9.52 lbs. nitrogen),
from Illinois; yield, 1,025 lbs. seed cotton;
gain, 53 per cent.
- Plot 3. 200 lbs. acid phosphate
150 lbs. manure salt
71.1 lbs. dried blood (containing 9.95 lbs. nitro-
gen; yield, 980 lbs. seed cotton; gain 46.4
per cent.

Among progressive agriculturalists it is known that peat humus has great fertility and long productivity because it is actually decayed matter, and is of much greater fertilizing value than undecayed organic material.

Prof. Lipman's report is not the first to find peat unworthy as a fertilizer, reference is here made to the Ohio Experiment Station, Bulletin No. 167, and Illinois Experiment Station, Circulars No. 105 and No. 123. Hopkins writes about this in his book on Soil Fertility (page 515) and states: "It will be noted that the disagreement between the 20-day tests of the Bureau and the nine years' field results of the Ohio Station is so nearly perfect, as to render the short-time culture experiments of no value." In the Journal of the American Peat Society, 1910, Vol. III, page 43, Prof. Haskins also reports on some comparative results with peat, but judiciously adds: "These results are not conclusive, as they only show one year's investigations." Further, Hopkins (page 593) states, that for experimental purposes we must rely primarily upon absolute facts furnished by chemistry and mathematics and be guided only by the results of carefully conducted and long continued experiments. Single examples can be found in support of almost any practice or theory that can be advanced; but mere experiment, though it be repeated invariably with the same results, for fourscore times, furnishes no proof whatever that the octogenarian will live to celebrate another birthday.

Prof. Lipman states that peat humus "is too old, too inert and therefore entirely too expensive," without offering the slightest proof of this erroneous assertion. If Prof. Lipman had consulted existing literature on this subject and witnessed

some of the excellent crops which grow on this soil, and for which purpose it is now being successfully used, he would certainly have hesitated ere he made this broad and sweeping statement. The universal success and long continued use of peat humus by the Long Island Railroad, in raising celery, onions, lettuce and other crops, is a fitting example to refute Prof. Lipman's assertion.

In summing up it must be said that Prof. Lipman's comparative tests bear no definite relation to the market value of the fertilizers used nor to their worth in use as fertilizers.

That pot tests of short duration are too inadequate and inconclusive to be used to form a valuation.

That in carrying out tests, comparison should be made with recognized organic fertilizers such as ground bone, castor pomace, cotton seed, rape seed meal, ground tobacco stems or garbage tankage, instead of with a fully nitrified inorganic salt.

The evidence of the fine growth of cultivated crops, practical field tests of long duration and the luxurious natural growth where humified peat deposits exist, should be depended on rather than mere laboratory experiments of short duration.

Prof. Lipman does not confine his hasty conclusions to peat humus, because in the same report (page 198) he makes a definite recommendation and retracts it in a footnote, on incomplete work.

AMMONIA FROM ATMOSPHERIC NITROGEN.

According to experiments by Eschweill, Hanover, a mixture of nitrogen and hydrogen, dry, exposed to a temperature of about 900 degrees C., will produce a certain proportion of ammonia. This can be increased if air and coal gas saturated with water vapor are passed over iron oxide, bismuth or chromium. In such cases the best yield of ammonia is between 570 and 660 degrees C., but it falls off as the iron is changed to peroxide. The oxide has, therefore, to be regenerated at intervals by a current of hydrogen or carbon dioxide at a high temperature, which is troublesome. Reducing substances, such as coke, wood charcoal, lignite, etc., were tried, along with the oxide of iron. These all acted well, but slowly; it was found that peat was by far the best material to use in this way. It was then found that with peat containing, say, one per cent. of nitrogen, more nitrogen is converted into ammonia, than the peat itself contained, so that the excess, at least, was derived from the fixation of atmospheric nitrogen. Sugar carbon was also found to give a good yield of ammonia in the same way, although it contained no combined nitrogen of itself.—The Gas World, 55 (1911) p. 632.

THE USE OF PEAT POWDER FOR SMELTING IRON IN SWEDEN.

The following description of the use of peat powder in the production of iron sponge was translated from a Swedish local trade and economic review and is abstracted from the Daily Consular and Trade Reports of recent date:

For some time past local experts have been experimenting with peat powder as a reducing agent for the production of iron sponge. Information has recently been published that is very promising.

For the production of one metric ton (2204 pounds) of iron sponge the average consumption has been 465 kilos (1025 pounds) of peat powder made from the usual mixture of fuel peat and white sphagnum moss. Coal has been used hitherto for heating the iron ore to make the iron sinter or sponge, but it is stated that ordinary spade-cut peat (sticktorf) can be used just as well, if it is burned in a gas producer, and the gas used for baking or roasting the ore.

The inventor has stated that the cost of peat powder is 8.50 crowns (\$2.28) per metric ton (2,204 pounds), without taking into account any royalty for the inventor and when no manufacturing profit above 6 per cent. for interest and sinking fund is included. The real cost of the peat powder is, therefore, about 9.50 crowns (\$2.55) per ton, though it could, possibly, in a large factory, be reduced to 9 crowns (\$2.41) per metric ton. Figuring on a cost of 9.50 crowns (\$2.55) per metric ton, the cost of the 465 kilos (1,025 pounds) of peat powder needed to the metric ton of product is 4.62 crowns (\$1.24). The consumption of coal is not stated. The promoters have, however, stated that the aggregate costs of reducing agent and fuel for one metric ton of iron sponge will be 6 to 8 crowns (\$1.61 to \$2.40) depending on the location of the factory with reference to the peat bog and the peat powder factory.

The promoters of this new method for the production of iron consider that they now have good reasons for believing that they can produce the supply of iron for raw material needed by Sweden at such prices that competition will be possible with the coke iron of foreign production.

UTILIZING ONTARIO'S PEAT BOGS.

(From Consul Harry A. Conant, Windsor.)

It is announced by the Mines Department of the Canadian Government that the associated manufacturers at Brantford, Ontario, have become so convinced that the air-dried peat method employed by the Mines Branch can be made a commercial success, that they have contracted with the Government to continue the work at Alfred, Ontario, and will spend over \$50,000 of private capital in trying to improve peat machines. This action was decided on only after a thorough investigation. The machine to be used will have a capacity of 60 to 80 tons per day, as compared with the 30 tons the Government turned out.

The Government experimental plant at Alfred exhibited samples of machinery and of peat ready for market at the Ottawa fair. A thousand tons of peat were made up, which was sold at \$3.25 a ton. The orders came with such a rush that the supply was soon exhausted. The peat was used in parlor grates, in kitchen ranges, and in furnaces. It burns to a fine ash, there being practically no residue, and is much cheaper than coal.

(From Consul Harry P. Dill, Orillia.)

The result of the Dominion Government's experiments in the production of fuel from the peat bogs of Alfred Township, Prescott County, have been so successful that the Canadian Pacific Railway has opened negotiations with the Government for the purchase of these bogs. Should the railway company secure the property, it is understood that the output of prepared peat will be greatly increased, and that Montreal will be one of the cities selected in which to sell the fuel.

There are vast bogs in many parts of Ontario; in some few sections work has been done on a small scale, but the output was never of much importance. The success in the present instance will be apt to start operations in many places, the more so because of the scarcity of wood and the high cost of coal.

G. Herbert Condict, of New York, made an extensive investigation of the fertilizer filler industry of the country during the early part of the winter, in behalf of clients. While making the study he visited most of the plants which have been in operation during the past season. He also spent some time in Washington in the course of this work. Mr. Condict is now in Jacksonville, Fla., where he has an office.

Some Remarkable Peat. Under this heading, "Fuel," one of the coal trade journals, published in a recent issue the following: "A Dublin (Ireland) despatch states that a successful attempt has been made to use peat instead of coal for industrial purposes. It is alleged that experiment has shown the possibility of securing for \$22 worth of peat the same amount of energy as would be produced by \$69.50 worth of coal."

The story does not seem highly improbable, but as details filter through the various English engineering magazines, it seems to be quite true, in substance at least. The facts seem to be that a new type of gas producer, designed for using peat, has displaced an older pattern for using anthracite coal in an Irish woolen or linen mill. The new producer runs successfully on cut peat and the tar recovered from the cleansing of the gas is of superior quality and can be sold readily at a good price. This fact, taken in connection with the low price of the cut peat, and the excellent quality of the peat gas, makes it possible to reduce the fuel bill substantially as stated in the article quoted. The details are to be found in the article on page 197 of this number describing the Irish plant.

A New Peat Drying Process. Dr. Oscar Dyckerhoff, the General Direktor der Nasspress-Gesellschaft, Nurnberg, Germany, claims for the presses built for his company that they give the cheapest process yet devised for getting the water out of peat. According to his statement, by use of this machinery the water content of peat containing 85 per cent. water can be **instantly** reduced to 50 per cent. And, much more important, he says that a cubic meter (1.3 cubic yards) of the material so dried to 50 per cent. moisture, weighing about 1,000 kilograms (2,204 pounds) can be produced at a cost, including interest on the plant, of about 14 to 15 pfennig (3.5 to 3.75 cents).

This is a most important statement, and if true on a commercial scale, is far cheaper than air drying by the usual method, for the peat blocks cannot be turned on the drying field at such a low cost as $3\frac{1}{2}$ cents a ton.

When it is considered that peat with 50 per cent. moisture can be used in some types of gas producers, and that drying by any method goes on rapidly after this moisture content is reached, the importance of the announcement to all who are interested in industries based on dry peat production is readily seen.

A more detailed statement regarding the process and machinery has been promised by Dr. Dyckerhoff in the near future.

A **Fuel Economy Symposium** was held in Rumford Hall, New York, at a joint meeting of the American Chemical Society, the Society of Chemical Industry, and the American Electrochemical Society, on Friday evening, November 10, 1911. Among the papers read was one entitled, "Is Peat an Important Fuel in America?" by Charles A. Davis, which was well received and provoked some discussion. The American Peat Society was well represented at this meeting by the President, the Secretary-Treasurer, the majority of the Executive Committee, two of the Editors and a number of members. Other topics presented were "Some Attempts at Economy in Steam Making," "Fuel Gasification for Industrial Purposes," "A Continuous Carbon Dioxide and Temperature Recorder and Its Application to Combustion Efficiency," "Deterioration and Spontaneous Heating of Coal in Storage," "The Distribution of Heat in Boiler-Plant Operation."

New Zealand Government Drainage Operations. The Department of Lands and Survey of New Zealand is engaged in draining 90,000 acres of peat swamp at Matata, Bay of Plenty, to render it fit for agriculture. The work is in charge of O. N. Campbell, Surveyor and Assistant Engineer for the Government, who recently made inquiries of the Secretary of this Society relative to similar work in the United States. It is needless to say that the desired information was furnished him promptly.

Dr. Joseph Hyde Pratt, of Chapel Hill, N. C., who was prevented from attending the annual meeting of the Society by a serious injury to his foot, was in Washington during the latter part of December, in attendance at the meetings of the Geological Society of America and of the Association of State Geologists. He was still somewhat lame, but anticipated no farther trouble from his injury. He expressed great interest in the report of the meeting at Kalamazoo and stated that the drainage of peat lands in North Carolina was progressing rapidly and satisfactorily.

Robert Ranson, of St. Augustine, Fla., reports that, since his return to the United States in September, 1911, he has been very much occupied on plans and construction work for a new plant to be located on an extensive peat deposit on San Pablo Creek, about midway between Jacksonville and St. Augustine. Mr. Ranson is associated with W. A. Beswick, of Stockton, Eng., in this enterprise, which will be a most interesting one.

Peat Land Destroyed by Fire. During the latter part of the summer several bad fires in drained peat deposits were reported in the Middle West. The most serious of these was in the northern part of Henry County, Ill., about 10 miles northeast of Geneseo, where a tract of about 100 acres was burned to a depth of one and a half to two feet, and the peat practically all burned off the area. This immense store of the accumulation of valuable material of many generations of plants, which, if carefully handled and rightly cared for, would have insured valuable crops from the land for an indefinite period, was thus completely wasted. The fire was finally stopped by digging a ditch from 2 to 4 feet deep around the entire tract.

American Peat Society Official Lectures. Carl G. Kleinstück, Vice President of this Society, aside from his having the distinction of being the largest known producer of peat fuel in the United States for 1911, and of managing a most successful annual meeting of the Society, is acquiring fame in other lines of effort, as is shown by the following clipping from a Kalamazoo paper dated November 8, 1911:

"One of the especially interesting assembly talks of the year was given Tuesday morning before several hundred students and the members of the Western Michigan Normal School faculty, by C. G. Kleinstück. His subject was "Peat," and as an authority on the production and other points pertaining to this topic, Mr. Kleinstück is well known."

Dr. T. A. Mighill, Vice President of the New England Section of this Society, was confined to the house for several weeks in December and January as the result of an injury to his foot, received while on a peat-hunting expedition. He and his assistants were thrown from their automobile by a collision, due to bad roads, and although they all escaped serious injury, they were more or less shaken up, and Dr. Mighill had three bones in one of his feet broken.

Peat Utilization in Germany. Wm. C. Teishmann, U. S. Consul in Stettin, Germany, states that the annual production of peat fuel in Germany is over 11,000,000 tons, and the area of peat bogs in the country is about 4,942,000 acres.

New Fuel Found in Illinois. According to a short note in "Fuel" for November 7, 1911, Mr. A. A. Simmons, living a short distance north of Stockton, Ill., has a strange kind of fuel on his farm, which is entirely new in that section and so far has not been named. The fuel has the appearance of coal, but is not so heavy. Mr. Simmons gets the fuel from a slough on his farm and has several tons in his cellar. He burns it in his furnace and reports that it makes a good, hot fire. It must be thoroughly dried before using and is much cleaner than coal; it has the appearance of peat, but is darker in color. "A Standard Oil man claims that there is oil in the fuel." Can any Peater name this strange product?—Ed.

New Members. The Secretary reports that new members, literally from all parts of the world, are applying for admission to the American Peat Society. Unfortunately, however, some of those who have been with us heretofore have either lost faith and become discouraged at the slow progress of our propaganda, or have found more interest in other matters, and have joined the ranks of our "past members." It is hoped that every one of our active members will awaken to the need of making a more active personal effort to secure new members.

A New Peat Gas Producer. A preliminary announcement of a new peat gas producer has been made by a New York engineering firm. Details have not yet been received, but it is hoped to secure them for publication as soon as the producer is tested.

The National Peat Products and Chemical Company, with offices at Morrison, Ill., is reported by newspapers of the region to be actively engaged during the fall and winter in construction work in Union Grove township, Ill., erecting a plant.

Two buildings are being built, the larger of which is to be 80 feet long, 42 feet wide, and 22 feet high. The smaller, to be used as an engine and boiler house, is 40 feet long, 30 feet wide, and 17 feet high. They are substantially built of cement blocks, and the walls were nearly completed in the middle of December. These buildings will be equipped and ready for use early in June.

The C. B. & Q. Ry. Co. has built a sidetrack and established a station at the plant. This station is called Sollars, in honor of the president and general manager, Mr. C. S. Sollars. At present the head office of the company is at Morrison. The officers are: Charles S. Sollars, President; W. F. Waddell, Vice-President; and Andrew J. Barney, Secretary and Treasurer. Gas, carbon black, printing inks, poultry and filtering charcoal, fertilizer fillers, and condiments for all kinds of stock are among the products to be manufactured. This company, according to newspaper items, will make retort gas to be used in nearby towns. Among the by-products to be put on the market will be printing ink, coke and charcoal for various uses, stock food, etc. Some of the proposed uses are novel.

Peat for Reducing Iron Ores. A process has been invented by Lieut. N. H. K. Ekelund, who is well known in the peat industry of Sweden, for the reduction of iron ore in the electric furnace, using peat powder as fuel. The dry powder is mixed in equal quantities with crushed iron ore and the gases generated by the reduction are diverted and made use of to produce the electrical energy required. The process has been tested and favorable reports on the tests have been received.

German Agricultural, Industrial and Colonizing Peat Project on a Large Scale. Counselor Von Raumer-Wittlage, of the Prussian Department of Agriculture, was recently given two years' leave of absence from his regular duties to direct the enterprise of a Berlin syndicate, which will erect a great central power plant for utilizing peat fuel by the Frank-Caro process of gas production and ammonia recovery. The plans further contemplate the drainage, colonization and cultivation of moorlands on a large scale. Counselor von Raumer will also be chairman of the board of directors of the Hanover Colonization and Industrial Peat Association of Osnabruck.—(Hanover Courier, Aug., 1911.)

Newfoundland Peat. During the past summer the Prime Minister of Newfoundland, Sir Edward Morris, had a Norwegian peat expert employed to make an examination of certain peat deposits in that country. It is hoped that his visit will result in placing in the hands of the Government of the Island the necessary information to enable it to proceed with the development of the fuel resources contained in these great deposits, or at least to show the people how they can be used to the best advantage.

English Purchase of Swedish Peat Deposits. According to an item in *Engineering* (London), Nov. 24, 1911, p. 717, an English syndicate has recently bought the large Dumme peat deposits near Jonkoping, Sweden, for the purpose of utilizing the peat for the manufacture of alcohol, and, more recently, the extensive Stora and the Tynges peat deposits, both near Vername, have also been sold likewise, it is understood, to an English syndicate.

Peat Fires as Mosquito Dope. A correspondent, who has tried it, writes: "A continuous peat smudge in a summer camp is the most efficacious mosquito scare imaginable. Even in the boat, when on fishing trips, a retired tin pan, with a peat fire in it, does excellent service. If there are no mosquitoes, the fire can be used to great advantage for "bait" warming when the air is damp and chilly and the inner man needs "tuning up." Hereafter all exponents of peat should carry a few peat bricks in their hats when they go fishing.

The Mexican Fuel and Power Company, supported by English capital, is installing a first-class peat fuel plant near Mexico City. The operating equipment will be electrical and ultimately a by-products gas producer will be installed for using the peat fuel. When fully developed this plant will be very extensive and thoroughly up-to-date. The manager of the new enterprise is thoroughly acquainted with conditions in Mexico and has had much experience in making peat products.

Marsh Improvement in New Jersey. Under the heading "Hard Blow at the Jersey Mosquito," the *New York Herald*, of recent date, announces the beginning of work on a comprehensive plan of diking and draining a tract of more than 750 acres of the well known Hackensack meadows, between Rutherford and Kingsland. The plan, as outlined, is to build a dike around the land and dig a ditch within this boundary into which lateral drainage ditches, crossing the land at proper distances, will be run. The dike will keep out tidal waters and the water which drains into the ditch inside the dike will be pumped over into the stream flowing among the marshes, by pumping stations established for the purpose at suitable distances.

The land thus reclaimed will be used for agricultural purposes and factory sites. It is planned to convert the drainage ditches into irrigation ditches during dry seasons by stopping the pumps and letting the water in from the creek.

Sphagnum Moss in California, for florists' use, is an expensive article, according to Carl Kleinstück, who made enquiries about the price of some that he saw in a store, on his trip west. He was informed that it cost \$6.00 a bale of about 100 pounds. "At this price," Mr. Kleinstück remarks, "I should think California would rather cultivate sphagnum than fritter away their time on lemons, oranges, almonds, figs, and that sort of cheap stuff."

Michigan Swamp to be Drained. Gun Marsh, about 20 miles from Kalamazoo, Mich., a tract of over 25,000 acres of, principally, open marsh, is likely soon to be drained, if present plans are carried out. This is probably the largest single area of wild land in the southern peninsula of Michigan, and is famous in peat annals because here Vice President Kleinstück, at one time, had a peat fuel plant, where he made many tons of his famous peat fuel. He still owns a considerable tract of the marsh, which, if drained, will be rich farming land.

Drainage of an Arkansas Swamp. The Morgan Engineering Company, of Memphis, Tenn., report that they are about to undertake to drain the sunken lands in northeastern Arkansas, which have been very wet since a severe earthquake in the region about 100 years ago. About 300 square miles, or 200,000 acres, are included. The contract, which was let January 25, 1912, calls for the construction of 300 miles of ditches, 280 miles of which will be from 40 to 50 feet wide and from 10 to 15 feet deep. The main canal will be 55 miles long. The surplus water will be led to the St. Francis and Tyronza rivers. The reclamation is estimated to cost \$1,500,000, or \$7.50 an acre, for the land directly benefited. This is one of the great drainage projects of the Southern States.

Peat Survey of Ohio. The Ohio State Geological Survey, co-operating with the U. S. Bureau of Mines, has been making a survey of the peat deposits of that State. The field work has been completed and the report is nearly ready for the printer. The field work and preparation of the report has been done by Dr. Alfred Dachnowski, of the Botanical Department, Ohio State University, who visited and tested all of the important peat deposits of the State.

Manitoba Peat Bogs, which were examined by Mr. A. Anrep, of the Canada Department of Mines, will form the basis for discussion in a part of a forthcoming Peat Bulletin of the Mines Branch.

The Fertile (Iowa) Peat Plant, after lying idle for nearly a year, was started up in the early summer and was in operation for some time under the supervision of E. E. White. The output, when the work was started, was about 20 tons a day, to be used for "commercial purposes."

CORRESPONDENCE.

Dear Mr. Editor:

The Saxonia Farm Peat Plant is just about as you left it more than a month ago. We have had an unusually wet fall, and, as a result, the peat produced in your august presence is just about as wet as the day it left the press. Of course it will soon freeze to pieces and be useless for fuel.

The faculty of the Western Michigan Normal School has invited me to give a lecture on peat to the students of that institution. Of course, having nothing else to do, I have promptly accepted and my heart goes out to the poor youngsters, who, I suppose, are expected to undergo the ordeal without a murmur.

Prof. Moorhead, of Andover, Mass., the great authority on prehistoric stone implements, has requested the loan of my collection of "peat stones," which, no doubt, you will remember, and I have shipped them to him and expect his report on them ere long. I will incorporate his opinion in a later letter.

Yours very truly,

CARL G. KLEINSTUECK.

Saxonia Farm, Kalamazoo, Mich., Nov. 1, 1911.

Dear Mr. Editor:

It is very easy to make a promise, but the keeping of it generally turns out the other way! In regard to my agreement to send you a monthly report of all the peat news that a kind Providence might be inclined to waft my way, I wish I had kept it before given!

Not a single peat letter has arrived here during the whole of November, so all I can write about is confined to what little I myself have done along the line of peat manipulation, and that has not consisted of **producing**, but **consuming** the precious stuff.

We have had a quite abnormally early beginning of winter and permanent fires had to be started a full month ahead of the usual time. Therefore, up to date, I have had all the chance I wanted to continue my tests of peat as a fuel; nay, I have had even much more of a chance than I have cared for, although so far the results of my respective experiments have been exceedingly gratifying.

A few years ago, when I bought anthracite at \$6.00 per ton (it is \$8.00 now) I used up just about a ton of it every 6 days, a dollar's worth a day, to keep my 16-room house comfortable during just about such weather as we have had here during November. This past month I have used peat instead of coal, with the following result:

On an average, about 35 scoopfuls of peat is all I need to keep the house warm for 24 hours. (Seven scoopfuls just fill a bushel basket holding 56 pounds.) Thirty-five scoopfuls weigh 280 pounds, and this quantity at \$5.00 per ton equals almost exactly 70 cents. At present prices of coal today my furnace would consume \$1.35 worth of coal daily, or practically double the amount it eats up in peat.

To this, however, it must be added that, first of all, our furnaces are constructed for coal and not for peat, a circumstance decidedly unfavorable to the latter. For example, in filling the furnace with peat for the night, say at 10 o'clock p. m., 10 scoopfuls are needed to keep the fire going for 10 hours! I do not think there is a coal furnace built for private houses with a grate surface large enough to prevent a complete covering up of the surface of the first by the 10 scoopfuls of peat that are actually needed to keep up the fire through the night. As an inevitable consequence, the live embers under the thick bed of fresh peat promptly constitute themselves a gas producer of the most modern kind, distill every bit of valuable gas out of the peat, and up into the chimney, long before gas or peat has had a chance to ignite and, as a further consequence, a large part of the fuel value of the peat goes up, not in smoke, but in unburned gas.

If the firebox of the furnace were large enough to allow a part of the already burning fuel to remain uncovered, the gases generated from the fresh fuel would have a chance to be ignited before they reached the chimney and a corresponding quantity of heat would be saved.

Another item of interest in favor of peat as fuel is the disposal of its waste. Really dry peat produces an almost imperceptible amount of soot and smoke in burning, so that the ashes are the only residue requiring attention, and the amount of these in comparison with that of coal is so conspicuously small, that peat fuel, on this account alone, is preferable to coal, even if peat-produced heat cost the same as that from coal. The best coal on the market, I am told by coal dealers, leaves 25 per cent of ashes, at least, and the poorer grades as much as 35 per cent. The best peat obtainable on this continent leaves less than 7 per cent of ashes; any peat with above 10 per cent ash I would hardly consider good enough for domestic fuel.

Peat ashes are practically free from grit and clinkers, powdery and comparatively light in weight, as a bushel basket of them, well filled and shaken down, weighed just 37 pounds, while coal ashes, which are hardly ever free from clinkers are invariably full of grit, will tip the scale at 47 pounds to the bushel, measured in the same way as the peat ashes.

Peat ashes, being more bulky than coal ashes, of course require correspondingly more space for storage, but in spite of this fact, the ashes taken from a peat-fed furnace, on account of the much smaller ash content of the peat, will readily find room in an ash bin of half the size of that necessary for storing the residue of a coal-fired furnace doing the same amount of work.

Still further, coal ashes are an uncompromising nuisance anywhere, while peat ashes on lawns or meadows are useful enough as a light fertilizer and for filling up small holes to more than pay for applying them.

It also must be considered as in favor of peat fuel that it never will burn out or warp grates or plates! I am told that railroad engines in Bavaria, exclusively peat-heated, do not need an exchange of grate bars under two years of use.

If you can cite any further arguments in favor of using peat fuel, or even against it, by all means let me have them, as you may well believe the matter is of interest to me and I want to know all about it that is knowable.

With peatific regards, I remain,

Yours sincerely,

CARL G. KLEINSTUECK.

Saxonia Farm, Kalamazoo, Mich., Dec. 1, 1911.

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EDITORIAL NOTES

The Present Number:—Once more the Editor has to explain a long delay in publication of the present number. For some reason which was neither under the control of the officers or the Editor, nor understood by them, the report of the meeting at Kalamazoo and the papers read there were not received until after January 1st. As the manuscript material in the hands of the Editor had been entirely exhausted with the last number of the Journal issued, nothing could be done to prepare a new number until the papers read at the meeting were received. At the time the papers were finally received other work was pressing and farther delays were thus made necessary, and it was only recently that the necessary editorial work on the manuscripts could be completed. The results are finally before you.

Mr. Herbert Philipp, of Perth Amboy, N. J., has kindly agreed to take charge of the arduous work of abstracting current periodical and other literature relating to all phases of the peat problem and will act as Exchange and Abstract Editor, and all articles for review should be sent to him. The result of this infusion of new blood into the Editorial Force is to be seen in the long list of abstracts published in the present issue. There are other departments of the editorial work that would be much strengthened by some assistance from the members of the Society.—C. A. D.

The Publication of Abstracts. With this issue we start classifying our abstracts, and also greatly increasing their number. Our object is to try and keep all of the members of the American Peat Society posted on the contemporary literature and patents relating to peat and peat utilization. In carrying out this work the editors search all current periodical literature that is available. This may not appear very exacting to the members of the Society, but it entails a large amount of work, especially as the editors have personally to attend to all details of the publication of this additional matter.

As is well known, nearly all the money from our present membership dues is used in publishing this Journal and if our members find it a useful medium for obtaining current information about peat, they will make it even more so by assisting to increase the membership of the Society and thereby assuring the more frequent appearance of the Journal with larger contents than can at present be afforded.

The editors have hopes that the members will appreciate the effort which each number of the Journal entails and that they will show this by making personal efforts to increase the membership, the importance of which cannot be overlooked.

The progress of all science is due to cooperation, and the more complete the cooperation in the American Peat Society the greater the stimulation will be to start and build up a North American Peat Industry.

The editors are doing all in their power to help the Society along, and the membership should do their share by increasing our membership and **DO IT NOW.**

Patent Citations. A word regarding dates on patents: It will be noted in the notices of patents that some European patents have issuing dates of several years back; the explanation is found in the international agreement between some of the European governments, whereby patents shall be dated from day of application and not from day of issue as in United

States of America. Moreover, some descriptions of patent applications will be found because some European governments publish the patentee's application previous to allowing the patent claims, so that objections from others can be filed and considered.

We do not claim that our abstracts completely cover current literature, but the editors are making full use of the facilities which at present they can command.

Plan of Classification. For the present those abstracts which are published will have the following classification:

- Class I.—Peat Plant and Machinery.
- Class II.—Peat Fuel and Briquets.
- Class III.—Peat Distillation and Coke.
- Class IV.—Peat Gasification.
- Class V.—Peat Products: Ammonia, Tar, Oils, Etc.
- Class VI.—Peat Fiber and Litter.
- Class VII.—Peat Deposits and Soils.
- Class VIII.—Peat Drainage.
- Class IX.—Peat Filler.
- Class X.—Peat Fertilizers.
- Class XI.—Peat Chemistry.
- Class XII.—Miscellaneous Abstracts.

Several classifications have been tried and this one appeared the best to begin with. It is, of course, practically impossible to make a classification which would cover every possibility at once, so that if an article, for example, regarding the nitrogen in peat for filler purposes was also of a chemical nature, the abstract would appear under Class IX., Peat Filler, and the title would appear under Class XI., Peat Chemistry, giving reference to Class IX.

H. P.

REVIEWS AND ABSTRACTS OF RECENT PUBLICATIONS ON PEAT.

Class I.—Peat Plant and Machinery.

Methods of Gathering Peat. K. I. Crossley and T. Rigby, Openshaw, Manchester, England. Br. Pat. 13,391, June 2, 1910.

The peat is taken from the bog by a dredge or excavator and converted into a pulp on the spot by a disintegrating machine. It is then pumped through a pipe line to the required spot, water being added if necessary. The excavator, disintegrator and pump are carried on one or more pontoons floating in the bog. The pipe line, which also floats in the bog, has flexible joints. H. P.

The Berrigen Continuous Bucket—Chain Filter Press. Scientific American Supplement, No. 1870, Nov. 3, 1911, p. 292, 1 Ill. Describes and figures a filter press that may be of value in removing a part of the water from wet peat, preliminary to artificially drying it for fertilizer or similar uses. C. A. D.

Apparatus for Extracting Water from Coal, Peat, Etc., C. Burnett, Durham, Eng. Eng. Pat. 23,215, Oct. 7, 1910.

The material is fed through a hopper into a horizontal, cylindrical chamber having perforated walls for the escape of water, in which it is compressed by a reciprocating piston; the feeding and compressing means are operated independently, the pressure of the piston being applied when the material is stationary. By means of a ram, or similar device, the partly dried material is further compressed at a point near the delivery end of the chamber, this pressure being exerted during the return movement of the feeding device. Jour. Soc. Chem. Ind., Vol. 30, p. 1303, (1911). C. A. D.

A Report on an Examination of Wielandt's Peat Plant. (Bericht über die Besichtigung des Wielandischen Torfgewinners.) Dr. L. C. Wolf, Madgeburg, Mitteilungen des Vereins zur Förderung der Moorkultur. 29, (1911), pp. 389-393, 418-420.

The first article (pages 389-393) gives an account of the operation of the automatic peat digging, macerating, and spreading machine developed by Dr. Wielandt in Oldenburg. The second paper (pages 418-420) is a discussion of the first in which both the author and the inventor take part.

In the discussion it is shown that the machine, as operated when Dr. Wolf examined it, 6 men were still needed to attend it, but he believes the number could be reduced to 5 or even 4 when contemplated improvements have been added. He recognizes the excellent work of the inventor, but believes

it is better to criticise carefully than to be too optimistic. It is shown, however, that even though 6 men are needed, the machine lays out 95 bricks on the bog each minute, which gives 50 tons of dried fuel for a ten hour day, at a cost of 2.90 marks (or 70 cents) per ton of dried peat fuel; quite a remarkable performance.

Peat Plant. U. S. Patent 1,011,452; Dec. 12, 1911. Sp. p. 2358; U. S. Patent Office Gaz. Vol. 173, p. 403. Leo B. Lincoln, Chicago, Ill., assignor to Peat Industries Ltd., Montreal, Can., a corporation.

Class II.—Peat Fuel and Briquets.

Plant for the Manufacture of Peat Briquets. T. Franke, Wiesbaden, Germany. Br. Pat. 14,640, June 17, 1910.

The wet peat is forced along a conical perforated double-walled casing by means of a conical worm having projecting ribs in the blades and mounted on a perforated hollow shaft. By producing a vacuum in the double-walled casing and hollow shaft, the removal of water is facilitated. The peat is then fed through a flattened nozzle to a set of three hollow perforated rollers, where a further amount of water is removed and the fiber is partially disintegrated. After leaving the rollers it passes into a hopper, where it meets and is mixed with finely divided coke. By means of another worm and cone the mixture is forced through a tube, past a cutting device, and into a press having a hollow perforated piston for the further removal of water. The briquets then pass to the glazing and drying tanks. (Soc. Chem. Ind. 1911, 1042.)

Manufacture of Briquets Formed of Coal, Peat, Coke, Wood, and Other Solid Combustibles Mixed with Liquid Combustibles. Naamlooze-Benootschap Briquet Co. French Pat. No. 429,781; May 17, 1911.

The materials are given a thorough grinding and mixing in suitable mixing machinery, so that a product is obtained in such a plastic condition that it can be formed into briquets without the addition of a binder.

Combustible for Briquets. The Peat Coal Investment Co., Ltd., London. Belgian Pat., 237,563.

Peat Fuel Deposits in Sweden. C. H. Graves, Min. and Eng. World, Chicago, Aug. 5, 1911.

There are immense deposits of peat in central and northern Sweden and an entire absence of coal deposits. A new invention proposes to prepare peat powder which may be blown by an electric fan into the combustion chamber of a furnace

or steam boiler. Heated air is used to carry the powder, and the combustion is said to be complete. The experimental plant for the manufacture of peat powder was installed at Back, in the interior of Sweden, at a peat bog about 8 ft. deep. The capacity of the digging machine was about 40 cu. yds. per hour. Alongside were laid movable tracks and upon them small dump cars conveyed the peat to a field, where it was spread out to dry. Swedish peat, when dug out of the bog, contains 90 per cent water and 10 per cent vegetable matter. The air removes about 30 per cent of the moisture. The peat is then carried by trolleys to the crushers. From these the fine peat drops into a sieve, or bolting machine, and is bolted. From this the resulting powder is carried by a scraper chain to the top of the oven, the coarser products of the bolting being reground and re-bolted. The first bolting is supposed to yield about 50 per cent of powder. After drying in the oven the powder is again bolted and packed in sacks. It still contains about 15 per cent water, but that is not enough to interfere with its combustion. The peat powder when finished must be all fine, of uniform pulverization, and free from vegetable fibers. The waste fibers can be sold for domestic use.

The Northern Steam Boiler Association has tried peat powder as fuel under steam boilers. The air was heated in the smoke flues of the furnace to about 200° F. previous to blowing the powder into the furnace. It was found that one ton of coal was equivalent to 1.4 tons of peat powder, the latter being of poor quality, and to 1.2 tons if better quality had been used. The "heat effect" of the boiler is stated to have amounted to an average of 75 per cent when heated by peat powder and 64 per cent when heated by coal. This is said to be partly because of the more intimate mixture of the heated air and fuel possible when peat powder is employed and the more complete control of the proportions. The saving effected in using the powder was 17 per cent. (Jour. Soc. Chem. Ind. 1911, 1040.)

Peat Powder for Fuel. Zeit. Ver. Dtsch. Ing., 1911, Vol. 55, p. 1541. Experiments have been started in Sweden to use peat in powder form for burning under boilers. The peat is blown into the fire-box by means of a fan, which is driven electrically and requires 1 H. P., and air sucked in by this ventilator is preheated by the flue gases to 76° C. The proportion between air and the peat powder can be accurately regulated. The results have so far shown that the calorific value of one ton coal corresponds to 1.397 tons peat of low grade and 1.2 tons peat of high grade. (Refers to the work of Lieut. Ekelund.)

H. P.

Briquets from Peat. The Chem. Tr. Jour., 1911, Vol. 49, p. 368.

A company is about to be formed for the purpose of manufacturing a briquet from the peat which exists on a common known as Goss Coch Caron, in Cardiganshire. The greatest reticence is being observed, and the facts, so far, are taken from the action of the promoters in negotiating with the Great Western Railway Company to allow a siding between Tregaron and Shata Florida, and we are informed that this is likely to be carried into effect. If so it will prove a boon to the lead mines that exist also in that particular district. A few years ago a party of German chemists were touring South Wales, and in their travels visited this particular common, and were much struck with the value of the peat. They found on investigation that from 70 lbs. of this peat they could extract a little over 6 gallons of liquid products and about 8 lbs. of carbon. The latter was treated by moulding, and it turned out a fairly solid briquet, and it is the intention of the company now forming to place this on the market as fuel. The promoters say it will burn equal to coal, with scarcely any smoke, and leave only 3 per cent of ash, and it is thought they will be able to sell same at 6 shillings (\$1.42) per ton. In some places the thickness of the peat extends to 70 ft., and as the smell of peat is stated by medical men to be healthy, while coal vapors are unhealthy, it is claimed that a ready sale can be made.

H. P.

Production of Briquet Fuel. K. I. Crossley and T. Rigby, Manchester, England. Br. Pat. 12,013, May 14, 1910.

The vapors from the drier of a briquetting plant for brown coal, peat, or similar fuel, are mixed with the air supply of a gas producer of the recovery type, so as to save the cost of raising steam for the producer. The air and vapors may be drawn through the producer by suction, or a blower may be arranged between the drier and the producer, or air may be forced through the drier to the producer. A dust-collecting device may be interposed between the drier and the producer. When the briquetting plant is used for wet carbonized peat, and the peat is superheated before briquetting, as described in Br. Pat. 12,010 of 1909, the vapors together with air are passed through a dust-separator and are then forced by a compressor through a steam superheater and then through the peat superheater of the briquetting plant, and finally to the gas producer. The quantity of air mixed with the vapors is adjusted so that the mixture leaves the driers at 85° C. (Soc. Chem. Ind. 1911, 1105.)

Peat as Fuel. Coal Trade Journal 50 (1911), p. 395.

A short general discussion of the comparative value of peat fuel. C. A. D.

Peat Powder as Fuel. Engineering Record, 64 (1911), p. 238.

Short article summarizing the results of Lieut. Ekelund's work previously reported in this Journal. C. A. D.

Peat Powder to Supplant Coal? Mining and Engineering World, 35 (1911), p. 402.

Editorial on the tests of peat powder as fuel by Lieut. Ekelund and others in Sweden, which have been fully reported in this Journal. C. A. D.

Class III.—Peat Distillation and Coke.

Process for Carbonizing Wet Peat. The Peat Coal Investment Co., Ltd. French Pat. 431,364, June 14, 1911. Jour. Soc. Chem. Ind., 30 (1911) 23, p. 1368. See Eng. Pat. 6,041 of 1910, same Journal, 30 (1911), p. 883.

A Continuous Furnace for Carbonizing Peat, Wood, and Similar Substances. A. Wengler. French Pat. 430,257, May 27, 1911. Jour. Soc. Chem. Ind., 30 (1911), 22: 1304. The retort is divided into two compartments by a vertical partition, and during the operation these are used in turn for coking, one being available for discharging and recharging. The heat is maintained by the combustion of part of the fuel, or the gases generated during coking, the products being drawn off rapidly by means of ejectors. The ejectors are supplied with steam, which is generated from the condensed products of distillation in a boiler arranged in a chamber in which the coke is cooled and the steam is superheated in a coil passing around the wall of the retort. The lower end of each compartment of the retort is closed by means of which the coke can be discharged into a chamber beneath, and allowed to cool. In starting, a fire is built in this chamber and the combustion products are partly taken direct to the coking chamber and partly to the feeding hopper, which is arranged above the coking compartments.

Peat Coking. C. Gustav Nilsson, Goeteborg, Sweden. Ger. Pat. Application 12,240. Rec'd Oct. 2, 1909. Laid out Oct. 23, 1911. Open for objections till Dec. 22, 1911.

Coking plant, with drying ovens, for peat and similar substances which pass the raw material through containers by means of endless belts,—thereby designated:—that in the drying bin below the feeding for the dry containers (f) a transmission band (k) is attached, for the purpose of collecting material falling from the bins and transmitting the same to a storage bin.

The drawings show a part of the coking plant in question:

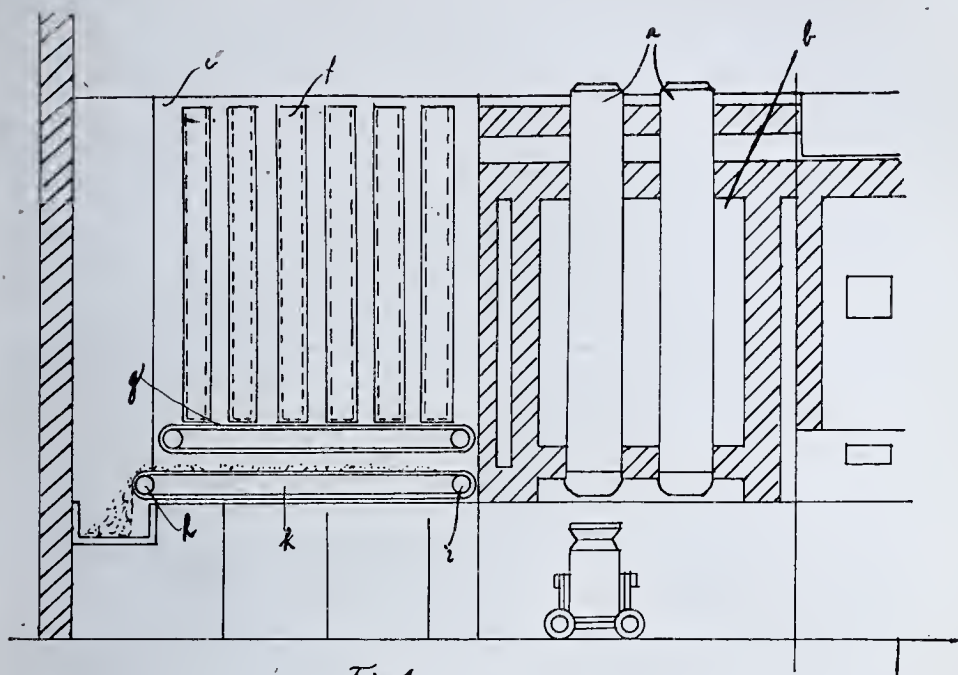


Fig 1.

Fig. 1 is a vertical section of an oven.

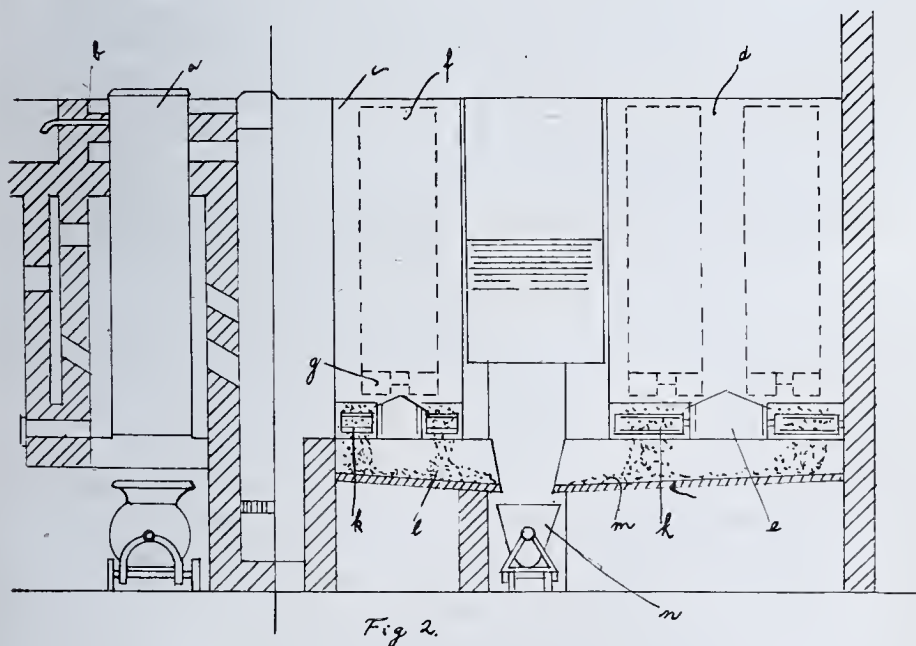


Fig 2.

Fig. 2 is also a vertical section, but in a plane at right angles to Fig. 1.

The invention applies to coking plants for peat, wood, etc., whereby the raw material, before it is placed in the retorts, is dried and preheated in drying ovens situated at the side of the retort. The raw material lies in containers which pass it through one or more rows, step by step. Whilst moving through the containers, which consist of sheet iron, there is a continuous falling down from the same. To work the process economically, it is, however, necessary to collect this waste and transmit it to the coking retorts. The principle of the invention consists of an apparatus to collect and transmit the waste.

A furnace (b) is provided with retorts (a), in which the coking takes place.

At the side of the retort oven there are drying ovens (c, d), where heated air is passed through the same, for instance through the reflectors (e) situated at the bottom of the oven. The raw material is placed in a known way in the container (f), which is gradually passed through the drying oven (c, d), by means of the endless belt (g) running on rollers, and is then carried out in a dried condition.

Under container (f) there are transmission arrangements, which can consist for instance of the endless belt (k) running over rollers (h) and (i), and carrying the waste from the drying ovens to the collectors (l) and (m). The cars (n) serve to carry away the collected waste. H. P.

Process for the Conversion of Bituminous Fuels such as Peat and Lignite into Gas and Coke. M. Ziegler. French Pat. 428, 342, Apr. 10th, 1911.

Vertical producer chambers and coking or drying chambers are arranged alternately side by side in series, and have valved outlets leading to a common gas main. The producer chambers have additional outlets at about the middle of their height leading to heating flues in the walls of the coking chambers and thence to the interior of the coking chambers. The apparatus is intended for use when the demand for gas is variable, as for example with gas engines. When the demand is normal, the producer chambers deliver gas direct into the main, but when the demand is reduced, the gas outlet valves are partially closed, and the outlet valves of the coking chambers are opened. Some of the gas then passes through the heating flues and through the coking chambers, its heat being thus used in drying and coking the fuel. The coking chambers are discharged at intervals through doors at their lower ends. Jour. Soc. Chem. Ind., 1911, 1150.

CLASS IV.—Peat Gasification.

Power from Peat. The Times (London, Eng.), Nov. 3, 1911. Our Dublin Correspondent telegraphs:

Information has reached me of what seems to be really successful attempt to use peat instead of coal for industrial purposes. A 400 H. P. engine was installed two months ago by Messrs. Crossley Brothers in the linen factory of Mr. Hamilton Robb, of Portadown, county Armagh. Mr. Robb's manager now states as a result of his experience that with this engine an outlay of £6 (\$30) a week on peat produces the same energy as was secured by an expenditure of £13 16s. 3d. (\$69) a week on anthracite coal.

The new process has, he says, the further advantage of extracting tar from the peat to the amount of 5 per cent of the total weight of the fuel. An equivalent of 30 per cent or 35s. (\$7) a week, is obtained from this by-product, thus reducing the weekly bill for fuel to £4 5s. (\$21), as compared with a former expenditure of £13 16s. 3d. (\$69). It is stated that these calculations have been confirmed by professional experts of high standing.

H. P.

Production of Ammonia from Peat and Similar Substances.

N. Caro, Berlin, Germ. Ger. Pat. 238,829, Dec. 18, 1906.

The material is gasified in a generator by a mixture of air with an excess of steam, in such a way that a separation of gasification and distillation gases does not take place, and that the air and steam is present in all parts of the generator.

The peat is fed into the generator through the funnel (b), which is joined onto the generator in such a manner as to prevent the in-rushing of air when feeding. The generator is provided with a mantle (c), in such a way that the middle part of the generator is closed off from the top and bottom parts through the walls (d and e).

The upper part of the generator is provided with openings to allow the gases to pass off, which are then led through the outlet pipe (g).

Through the pipe (h) a mixture of steam and air is led into the middle mantle space of the generator, which passes into the center of the peat material through the openings (i), whilst through the lower pipe (k) also a mixture of air and steam is passed through the peat mass resting on the grate (m), after it has been ignited.

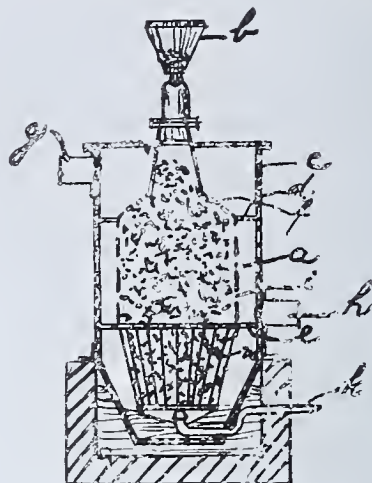


Fig. 3

The generator has a water seal. As soon as the process is in operation, the material in the lower part, which consists chiefly of carbon, is gasified by hot steam. The presence of air allows a certain amount of combustion to take place with corresponding heat evolution, which is carried to the upper layers. The mixture of steam and air also enters the middle layers of peat through the opening (i) and produces gas and hydrolysis, so that the largest part of the nitrogen is converted to ammonia, which together with the combustible gases passes through the openings (f) and is then led through the outlet pipe (g) to the ammonia absorbers, from which the combustible gases can be used for heating, illuminating or motive purposes.

H. P.

The Production of Gas from Peat. J. D. Olinny, Montreal, Quebec. Eng. Pat. 23,760, Oct. 16, 1909.

Identical with U. S. Patent 977,469, Dec. 6th, 1910. The peat is gasified by crushing natural moist peat while sprinkling it with petroleum oil to produce a pulpy mass, subjecting it to the intense heat, injecting air by forced draft to mingle with the gas from the peat during the coking, passing the air laden gas through liquid tar, withdrawing the by-products by condensation and collecting the gas.

H. P.

Gas Producer for Low-Grade Fuels. U. Zanella. French Pat. 429,637, May 12, 1911. Under int. conv., May 14, 1910.

A cone is suspended within the generator, in order to effect a better distribution of the fuel and to leave a hollow space in the body of the producer. In this way, the oxidizing and reducing zones of the producer are kept more distinct.

C. A. D.

Progress of Gas Power in 1911. R. H. Fernald, Engineering News, Jan. 4, 1911, pp. 24-25.

The paper treats the subject under the following heads: Large gas engine units; advance in the development of and application of the Diesel engine; tar as fuel for Diesel engines; internal combustion engine locomotives; gas turbines; surface combustion; producer gas from low grade fuels; small producer for bituminous coal; crude oil gas producers. Under the caption, "Producer Gas from Low-Grade Fuels," the author says: "Progress is steadily being made in the utilization of lignite, peat, and the high-ash coal in producer-gas work. The investigations of the Canadian Government show that peat can be prepared for fuel at a cost averaging from 30 to 40 per cent of that of an equivalent B. t. u. value from anthracite in Canada."

C. A. D.

A German Peat Gas Power Plant. Power and the Engineer, Jan. 9, 1912, pp. 53-54, 3 ill.

A short illustrated article on the peat gas producer and gas engine built by the Görlitzer Machine Works, Görlitz, Germany, and shown and operated at the East German Exhibition, held at Posen. The gas producer, designed by Heinz, is especially well illustrated. See also "Steam," 9 (1912), p. 68.

C. A. D.

Gas from Peat. Progressive Age, 30:2; 50 (Jan. 15, 1912).

Abstract of the section on peat gasification in Bureau of Mines Bulletin No. 16.

Some Types of Gas-Producer Plants for Power. Fernald, R. H., and Smith, C. D., Mining and Engineering World, Dec. 2, 1911, pp. 1120-1123.

An illustrated abstract from Bureau of Mines Bulletin No. 13.

A Peat Producer Gas Plant. Iron Trade Review, Jan. 11, 1912, p. 158.

A full abstract from the article in Engineering (Lond.) given elsewhere.

Ottawa Peat-Gas Plant. U. S. Consular Report. See under Canada's Peat Bogs, Class VII, p. 207.

Peat Gas-Power Plant Test. Steam, 9 (1912), p. 68.

A test was made recently of a peat gas power plant at the East German Exhibition at Posen, which gave satisfactory results. Assuming the cost of peat at 80 cents per ton, the cost of the current at the switchboard was 6.0 pfennig (1.2 cents)

per kilowatt. The plant was installed by the Görlitz Manufacturing Company, of Görlitz, Germany.

Lignite and Peat. Steam (editorial) 8 (1911), 151.

The consumption of lignite in those districts of the western and southwestern states remote from coal areas is rapidly increasing. Producer gas made from it furnishes with gas engines higher thermal efficiency than is obtained from coal in connection with the non-condensing steam engine. In many localities briquets are made from it without cementing material, which successfully endure handling and exposure. The briquetting process adds greatly to the thermal value. Aside from its worth as fuel, recent experiments show that lignite may be used most profitably for the production of sulphate of ammonia, at the same time supplying gas for power purposes as a by-product.

Our immense deposits of peat are likewise arousing renewed interest; its value, when produced, for generating steam equals that of some kinds of bituminous coal. It is also used quite extensively for the manufacturing of building paper. The indications are that the country's extensive tracts of lignite and peat are likely to become a most important national asset.

C. A. D.

Peat Gas in Brick Making. (Ueber Torfverwertung.) H. Sachse. *Tonind. Ztng.* 1911, pp. 160-161.

After discussing the great difficulties met with in drying peat and the advantages aimed at and in past gained by Ekenberg's coking process, the author considers the Caro-Frank gas producer process and its possibilities. This, in his opinion, can be made very serviceable, particularly in the clay industries, especially when peat beds are found in the neighborhood of tile, brick, and pottery factories. The existence of clay or fine loam as an undrained substratum is especially a favoring condition for the formation of peat deposits.

C. A. D.

Power from Peat. (Stahl und Eisen, 1911, 31, p. 1346.) The Görlitzer Maschinenbauanstalt und Eisengiesserei have a peat gas generator in operation at the East Prussian Exposition in Posen, Germany. This producer demonstrates the ease of handling the peat fuel and also its commercial application. Peat containing up to 50 per cent water can be used in this producer. It requires on an average about one kilogram peat per horse power hour.

Recently close studies were made on this generator by Prof. Baer of Breslau, and they were carried out on the fol-

lowing principle: The peat fed to the producer was weighed, the gas produced was used to run a gas engine and the work done by the gas engine was carefully measured.

The results were as follows: With the price of peat at 4 marks, (\$0.80) per ton, the cost per kilowatt hour at the switchboard was 0.6 pfennig (1.2c). The price of peat is placed somewhat high. Under manufacturing conditions, especially by use of machines, the price of peat is about 2 marks (40c) per ton, so that the above price of K. W. hour is about half, viz.: 0.62c. For about a year a similar installation is in operation in Russia. A recovery of the nitrogen in the peat as ammonia is not attempted in this process, as is done in the Mond or Frank and Caro processes. H. P.

CLASS V.—Peat Products: Ammonia, Tar, Oils, Etc.

Production of Ammonia from Peat. N. Caro, Berlin. (Chem. Ztg., 1911, 35, p. 505 and p. 515). This contribution is an account of Frank and Caro's work with peat in a gas generator. A brief review, of what has been done with coal previous to their work, forms the introduction. It was known that only 15 per cent yield of the combined nitrogen in peat could be obtained as ammonia by dry distillation and Caro thought that by the addition of steam he could get practically quantitative results, and this was corroborated by his later experiments. He found that by passing steam over dry peat at 350-550° C., nearly all the combined nitrogen could be converted into ammonia, and if an excess of steam was used, it could be recovered without decomposition. He noticed that when moist peat was used, that he obtained the desired results with the addition of very little steam. His trials were carried out as follows:

The peat was dried at 100° C., until its weight remained constant. An Heraeus oven was used to carry out the experiments and was provided with a porcelain tube 930 m.m. long and 20 m.m. internal diameter. The peat was placed, in fibrous condition, in the tube for a length of 250 m.m., and a platinum-platinum-rhodium pyrometer was used for temperature measurements. Steam was passed into one end of this tube, the tube being held at certain temperatures for each trial. The other end of the tube was connected with the necessary absorbing apparatus, to quantitatively determine the ammonia formed.

Caro gives the results of three series of tests he undertook, only a few of which are given here:

Test No.	Peat used gr.	Water used c. c.	Temp. °C.	Of the Total Nitrogen In Residue %	As Ammonia %	
4	25	295	300	26.3	30.2	
22	*50	360	300	31.3	52.6	} Series No. 1.
27	*50	380	450	0.1	97.3	
40	25	360	400	27.3	32.1	
41	*50	300	400	12.3	71.2	} Series No. 2.
47	*50	310	450	1.8	88.3	
56	*50	330	400		87.6	} Series No. 3.
57	*50	310	400		91.2	

*Wet peat used (50-60 per cent water).

Caro concludes from these tests that wet peat gives a higher yield of ammonia than dry peat, and he further states that the decomposition of dry peat requires more time than wet peat. He thus found the right conditions for using peat in the Mond gas producer. Caro writes as follows, after explaining the use of dry peat in the Mond gas producer: "By the use of wet peat, however, that is peat containing more than 40 per cent water (40-60 per cent), the following phases take place: In the higher zone a drying of the peat takes place. In a lower zone the material is decomposed and forms (by reacting with the steam) ammonia, etc. The 350-550° C. zone is inadequately small (thin), as the drying zone, where no ammonia is formed, occupies a large part of the generator. The dried peat passes therefore, too quickly through the decomposition zone and before all the combined nitrogen is converted to ammonia, reaches the coking zone. A nitrogenous coke is formed, which burns in the lower zone without forming ammonia, so that the ammonia yields become bad and furthermore, on account of the short time in the decomposition zone, the gases are poor."

For the effective use of peat in the Mond gas producer it was only necessary to raise the temperature of the drying zone of the producer to 250° C. to decompose the nitrogen as ammonia. This was accomplished by creating local combustion in this zone through the addition of air at stated places, or by strongly superheating the incoming air and steam mixture (to 450° C). This forms the basis of the Frank-Caro improvements and with them 70-85 per cent. of the nitrogen in the peat was obtained as ammonia.

The second part of Caro's contribution (p. 515) is practically devoted to the work of Woltéreck, who claims by his process to obtain more ammonia than corresponds to the nitrogen in the peat, explaining that the nitrogen of the air helps to form part of the ammonia. Caro carried out experiments

according to Woltereck's claims and thereby tends to disprove Woltereck's figures, stating that not in a single instance was he even able to obtain a 100 per cent yield of the nitrogen as ammonia. H. P.

Ammonia from Peat. H. Woltereck, *Compte Rendu*, 1911, 152, p. 1245. N. Caro claims in the *Chem. Ztg.*, 1911, Vol. 35, p. 516 (see this Journal p. 93), that the results claimed by Woltereck (*Compte rendu*, 1908, Vol. 146, p. 124) are entirely due to the reaction between the steam and peat and that atmospheric nitrogen plays no role in the reaction.

To clear up this question the author made a series of trials in which the peat was first treated with steam alone and, after the formation of ammonia was completed and the nitrogen content of the residue determined; the residue was treated with a mixture of steam and air.

A comparison of the nitrogen contents of the dry peat and the residue of both operations corroborated earlier trials (*Chem. T. J.* 1908, Vol. 42, p. 143) and proved that a noticeable increase of nitrogen had taken place in the last residues.

From the results obtained it can be safely concluded that only one-third of the quantity of ammonia is obtained by treating the peat with steam alone, as when it is treated with a mixture of steam and air.

Furthermore, is shown that the nitrogen lost by reacting with steam alone corresponds nearly to the amount regained as ammonia. An unexpected result was the complete absence of the formation of acetic acid in several of the trials, whilst a yield of 2.31 per cent was obtained in one of the trials. H. P.

Production of Ammonia by Passing Air and Steam over Heated Peat or Other Nitrogenous and Carbonaceous Material. J. G. Jone and P. Suarez, London. D. R. Pat. 234,793, June 18, 1910. Peat containing from 70-80 per cent water is placed in a generator, provided with a grate, and when the combustion zone has attained a temperature of 700-800° C., air and steam (or finely sprayed water) is passed in under the grate. Part of the gas thus produced is mixed with air (after the gas is freed from acetic acid, ammonia, etc.) so that a dry gas composed of 5-14 per cent carbon dioxide, 8-12 per cent oxygen, 1-2 per cent carbon monoxide, besides nitrogen, is obtained. This gas is passed in under the grate. The temperature is regulated so that a not too intensive combustion of the peat takes place and the combustion zone remains at 700-800° C., at which temperature the steam is not decomposed or the carbon dioxide reduced to carbon monoxide.

The generator is started by placing a layer of air-dried peat on the grate and this is burnt by supplying it with air.
H. P.

Production of Ammonia from Peat. (Reply to Caro's contribution in the Chem. Ztg., 1911, Vol. 35, p. 505, 515.) H. C. Woltereck, London. (Chem. Ztg., 1911, Vol. 35, p. 734.) This communication shows primarily that the honor of first gasifying peat does not fall to Frank. Woltereck also states: "The temperatures given are incorrect. All authorities agree that the temperature of the gases leaving the Mond gas producer are 450-500° C., and therefore the temperature of this highest zone can hardly be under 450° C., but is at least 500-600° C.; whilst the lower zone must be at least 700-800° C., as the so-called lower zone requires a minimum temperature of 900° C., and is in practice raised to 1000-1100° C."

Woltereck further shows that Caro has used in his trials some of his patent claims and refers to the previous controversy between Caro and Lymn. (See Jour. Am. Peat Soc., 1911, Vol. 4, p. 50, 93.)
H. P.

(It is very noticeable in Woltereck's communication that he does not refute the results Caro obtains in the trials carried out according to his claims.—H. P.)

Coloring Matter from Peat. Dededat, Gironde, France. Fr. Pat. 410,559, Nov. 25, 1909. Describes the manufacture of dyes, by boiling the bark or wood of peat with an alkaline solution, and evaporating or precipitating to obtain an alkali or acid coloring matter similar to carmine or dyer's weed.

H. P.

Ammonia. H. C. Woltereck and Sulphate Ammonia Company, London, Eng. Br. Pat. 15,285, June 25, 1911. In the slow combustion of peat by air and steam for the production of ammonia, wherein a part of the exhaust gases or products of combustion containing steam are, after the removal of ammonia and any other by-products required, returned to the furnace, the temperature of reaction instead of being kept below 500° C. is kept between 600 and 800° C. by controlling the composition of the mixture of air and exhaust gases, the percentage of oxygen being kept too low to allow of the production of combustible gases.

H. P.

The Direct Recovery of Ammonia from the Distillation Gases of Coal, Wood, Peat and the Like, in the Form of Tar-Free Sulphate. German Patent 25,806. H. Punung, Munster i Westf.

CLASS VI.—Peat Fiber and Litter.

Process and Apparatus for Treatment of Peat Moss ("Sphaigne de tourbe") for the Manufacture of Paper and Card-board. A. Remmer and M. Wolsky. French Pat. 431,360, May 17, 1911.

The moss is treated, first, with a dilute alkali solution to neutralize the contained carbonic acid and hydrogen sulphide, and, second, with a solution of alum.

The refrigerating effect of this treatment is said to facilitate the separation of Methane or marsh gas, and other gases included in the material. These operations are carried out in a paddle washing machine, having a sieve-like false bottom. The paddle blades are concave in shape and are enclosed in a drum made of wire netting. Jour. Soc. Chem. Ind., 30, (1911), 23, p. 1376.

On the Value of Peat Litter. J. J. Tydvad, Hedeselsk. Tidsskr. (1911) No. 7, pp. 74-83.

A description of the manufacture, and of Danish experiments with peat litter as an absorbent of liquid manure. It is shown that losses of nitrogen in liquid manure can be entirely avoided by the use of sufficient quantities of peat litter as an absorbent. (E. S. R. 25:4.)

CLASS VII.—Peat Deposits and Soils.

The Value of Peat Deposits in Bavaria. H. Croissant, Bayerisches Industrie und Gewerbe Blatt, 1911, p. 341. Southern Bavaria contains altogether 1245 sq. km. (3200 sq. m.) peat deposits, which properly worked could produce cheap electrical and heat energy. It would be possible to produce for 50 years about 650,000-700,000 H. P. per ann. (300 10-hr. days per year), or 325,000-350,000 H. P. (as above) together with an annual supply of 1,000 million cb. m. (35,316 million cu. ft.) water gas.

This storage of energy has one great advantage over water powers, in that a small installation as well as a big installation can be run commercially. H. P.

The Use of Commercial Fertilizers on Moors, Heaths, and Marshes. Tacke, Jahrb. Deut. Landw. Gesell., 26, 1911, No. 1, pp. 137-144. (E. S. R., Dec., 1911.) A brief review of present knowledge on this subject.

Peat in the Province of Quebec, 1910. Rapport des Operations Minières dan la Province de Quebec Durant L'Annee, 1910, pp. 72-74. Bureau des Mines, Québec, Canada.

Briefly discusses, in French, the occurrence of peat in the Province and the operation of the peat plant at Farnham for the season of 1910. An English edition of this report is also published.

The German Moors and Their Agricultural Importance. Tacke; Illust. Landw. Ztng., 31 (1911) No. 16, pp. 143-146.

A general discussion of the extent and agricultural possibilities of bog lands with a view to stimulating their reclamation. (E. S. R., 25:3:216.)

Bog Cultivation in Germany. Jour. Bd. Agri. (London) 17, (1911) No. 12, pp. 999-1002.

A brief account of the origin, character, methods of fertilizing and the management of upland and lowland bogs in Germany, particularly in the region of Hamburg. Special emphasis is laid upon the use of the bogs as grass lands. (E. S. R., 25:3:2; 6.)

Notes on Some Danish-Scandinavian Peat Bog Sections, and the Character of the Mosses in Them. (Om tidsbestamning i de scanodaniska torfmossama.) R. Sernander. Geol. Foren., Stockholm Forhandl, 1911, No. 2, pp. 111-124.

The Improvement of Marsh Soils. Luedecke. Ztschr. Landw. Kammes Schlesiën, 15 (1911) Nos. 9, pp. 266-279; 10, pp. 300-306; 11, pp. 333-338.

The fertilizer constituents, agricultural value and reclamation of these soils.

In author's opinion stock farming, by which much of the land can be sown to grass and clover, is the best use to make of it, and he gives data showing the profits that may be obtained per acre under such a system of farming. Methods of cultivating and seeding are outlined. (E. S. R., 25:3:216.)

Canadian Peat Bogs. U. S. Consular Report. It has been estimated that the known peat bogs of Canada, which are probably only a small fraction of the total, cover an area of approximately 36,000 square miles, from which about 28,000,000 tons of air-dried peat could be produced. This would be equal in fuel value to some 14,000,000,000 tons of coal.

Believing that the most effective method of awakening public interest in the utilization of Canada's peat resources would be the establishment of a plant on a commercial scale, equipped with machinery and appliances that have been successfully used in European practice, a peat bog of 300 acres,

with an average depth of 8 ft., was acquired by the Canadian Government at Alfred, near Caledonia Springs, Prescott County, Ontario. About five miles of ditches have been dug, and a storage shed to hold 300 tons of air-dried peat, a blacksmith's shop, and an office have been built. The following modern machines, etc., have been installed: Peat machine, with conveyor, having a productive capacity of 25 to 30 tons of air-dried peat per day; a 35 H. P. steam engine, cable appliances for transporting peat about 1200 feet; field press; circular track about 1200 feet long for transporting dumping cars to field press; eight steel dumping cars, each 0.7 ton capacity; and 2500 feet of field track.

It is estimated that the expense of erecting a peat plant capable of producing 30 tons of air-dried peat daily should not exceed \$7000; and since workable peat bogs are scattered throughout the farming regions of Ontario and Quebec, the most economical plan for utilizing this fuel would be the erection of a number of plants at convenient points, to be operated in the interests of the neighboring communities.

Ottawa Peat-Gas Plant. During the summer of 1909 a substantial brick building suitable for equipment with modern fuel testing machinery and appliances was built at Ottawa, also a storage shed holding 150 tons of peat fuel. The present installation consists of a peat-gas producer, with the necessary cooler, scrubber, tar extractor, etc.; 60 H. P. 4-cycle gas engine; Westinghouse 50-kilowatt dynamo, direct connected; and a 60-kilowatt resistance coil to absorb the load when making tests; also a switchboard, with the necessary measuring and testing instruments.

The main building is divided into two parts, one of which is occupied by the peat-gas producer and its auxiliary apparatus. The other half is divided by a partition wall into two compartments, one being occupied by the gas engine and dynamo, the other reserved for an ore-dressing laboratory, to be equipped with a 40 H. P. motor and concentrating machinery, the power of which is to be supplied by electric energy generated in the adjoining peat-gas plant. The gas generating-room has been made large enough to accommodate other types of gas producers, especially designed for using bituminous coal or lignite as fuel, which it is proposed to instal in the near future.

Peat Uses in America. *Chemische Industrie*, (1911) Vol. 34, p. 661. The experiments carried out in Germany during the last few years to use peat, as fuel for driving gas engines and gaining the nitrogen as ammonium sulphate, has created

also American interests to start experiments in this line, especially because the American peat often contains 2-3 per cent nitrogen. In fact installations for the productions of power gas in generators with peat containing 40 per cent water have been undertaken with success. The drying of peat is especially advantageous in the South on account of the high temperatures. In Florida, for instance, it requires only three weeks to reduce the moisture contents to 40 per cent.

The most important peat territories are situated near the Canadian border and in the Eastern coast states, as also in the neighborhood of the swamps of the Mississippi and in the Gulf states. The estimated area of the peat deposits is 140,000 sq. miles. The colossal amount of valuable fuel existent is demonstrated by the fact that the total dry peat is estimated at 13,000,000,000 tons and valued at 193 billion francs (38,600 million dollars). There are therefore great possibilities for the development of a peat industry in America, especially in the production of gas and coke, when the by-products are taken into consideration. From the total peat not less than 640,000,000 lbs. of ammonium sulphate could be produced representing a value of 185,000,000 francs (\$37,000,000).

The most extensive peat territory is, however, Alaska. Here the peat deposits not only go to a depth of 9 ft., as in many of the principal deposits of the U. S. A., but reach a depth of 15-20 ft. in the southwest, and 30-40 ft. in the center and north of the country. At present this large territory has no economic value, but covers an area which is about equal to the deposits in the U. S. A.

H. P.

The Utilization of Our Peat Deposits, Taking into Consideration the Production of Power, the Recovery of By-Products and the Influence on Our National Welfare. C. Heinz. *Zeitschrift der Verein Deutsche Ingenieure*, 1911, Vol. 55, p. 368.

Estimating the disposable amount of peat in Germany, the author describes the production thereof: 1 kg. (2¼ lbs.) dry peat costs 1/6 pf. (0.03c) produced by hand, against 0.021 pf. (0.004c) produced by machinery. Peat is used as stable litter as a substitute for straw, for coverings and similar purposes, insulator material on refrigerating machinery and chiefly for producing ammonia. For the last uses the processes of Woltereck, Mond, and Caro and Frank come in consideration. In the last case peat is also used for the production of heat. As far as this is concerned the direct use of peat under boilers is not very successful. Only by gasifying peat can its heat value be economically used, and even here tar and moisture

contents present difficulties. He refers among other generators, which conquer such difficulties, to a suction gas producer of the Görlitzer Maschinenfabrik, connected with a gas engine of the same make, giving the details and costs of producing energy. The high efficiency of this generator demonstrates how the latent energy of the peat deposits can be used to advantage, even if the recovery of ammonia has to be abandoned, which recovery would only complicate the process.—H. P.

CLASS VIII.—Peat Drainage.

Reclamation of Marsh and Swamp Lands in Norway. Daily Consular and Trade Reports, Jan. 8, 1910, p. 116.

A society known as "Det Norske Myrselskab" (The Norwegian Bog Society) is maintained by the Norwegian Government for reclaiming marshes and swamp lands and developing the manufacture and use of peat. The society disburses Government appropriations in investigating marshes to ascertain the best uses to which they may be put. Whenever marsh reclamation work is approved in advance by the society, it contributes one-fourth of the total cost of the work.

During the 15 years that the society has operated in the two counties of North and South Bergenhus, 1,157 acres of marsh and swamp lands have been converted into good, tillable fields, at a cost of \$25,634, a fraction over \$22 an acre. It is estimated that the milk alone from the cows which this land will support will bring to the district an added income of \$24,118 a year.

CLASS X.—Peat Fertilizers.

Nitrogenous Manure from Peat. P. Variot. French Pat. 426,311, Feb. 21, 1911.

The peat is moistened with water and reduced to a pulp in the disintegrator, from which it is led into backs or vats provided with stirrers which keep the peat in suspension and allow mineral, earthy and calcareous matters to settle. The cellulose is extracted from the purified pulp by known chemical and mechanical processes, and the liquid, which contains the nitrogen of the original peat, is run into decanting backs or basins, and dried for direct use as manure. The separated cellulose is treated in any desirable way to produce paper-pulp, plastic materials, glucose, etc. (Jour. Soc. Chem. Ind., 1911, 970.)

Manuring Experiments with Peat. A. I. Dreiman, Abs. in Internat. Inst. Agr. (Rome), Bul. Bur. Agri. Intel. and Plant Diseases, 2 (1911), No. 3, pp. 527, 528.

In experiments with peat alone and in combination with bone ash, Thomas slag, potash salts, and sodium nitrate, on barley grown on sandy soils, it was found that peat alone nearly doubled the yield of grain, but that the peat mixed with Thomas slag, potash salts and sodium nitrate did not give as large a yield as a complete mineral fertilizer without peat.

Inoculated Humus and the Process of Making the Same. C. Ellis, Montclair, N. J., assignor to Ellis Foster Co., U. S. Pat. 1,002,248, Sept. 5, 1911.

Peat containing a high percentage of nitrogen is dried and mixed with 2 to 8 per cent, of borax waste (chiefly gypsum and calcium carbonate containing borax), and is then sterilized by heating. Three to five per cent. of basic slag is added and the mass is moistened with a solution of nitrogen-assimilating bacteria and exposed to air or passed through a heated chamber to convert the nitrogen present in the peat into nitrogen compounds available for plant life.

CLASS XI.—Peat Chemistry.

The Acid Content of Moor Water. K. Endell, Jour. Prakt. Chem. n. ser. 82 (1910) No. 19-21, pp. 414-422; abs. in Chem. Ztng. 35 (1911) No. 19, Repeat p. 37.

Tests showed a decided acidity in the water from a number of moors. This acidity is attributed entirely to free carbon dioxide. The brown-colored colloids removed from the water by dialysis were not acid. (E. S. R. 25:3:216.)

On the Composition and Fertilizing Value of Peat Ash. H. von Feilitzen. Mitt. Liv-Estland. Bur. Land-eshult, Jahr. 1909-10, pp. 31-34.

Analyses given showing variations in lime from 5.79 to 21.04 per cent., with average of 13.26 per cent.; in potash from 0.52 to 2.21 per cent., with an average of 1.16 per cent. The average of H₂O soluble potash was 0.25 per cent., and of citric acid soluble phosphoric acid, 0.96 per cent.

States that incomplete pot experiments indicate that the potash and phosphoric acid of peat ashes do not have as great fertilizing value as the same constituents in Stassfurt salts and superphosphate. (E. S. R. 25:3:218.)

Two Compounds Isolated from Peat Soils. C. S. Robison, Jour. Am. Chem. Soc. 33 (1911) No. 4, pp. 564-568.

The author isolated leucin and isoleucin from a sample of common brown peat. A sample of black peat was also examined, but the material obtained was too small to permit a separation of the isomers. (E. S. R. 25:4:320.)

Bog-toxins and Their Work in the Soil. (Moortoxine u. ihre Wirk auf die Boden.) A. Dachnowski. Zeits. fur. Agnew. Chem. 25, p. 37. A short review.

In regard to the Chemical Analysis of Bog Soils and Its Value for Cultural Purposes. H. von Feilitzen. Verhandl. Internat. Agrogeol. Konf. (Stockholm) 2 (1910), pp. 160-167.

The author gives a review of previous work on the subject, then calls attention to the advantage of using for peat soils the extraction method that first treats the sample with a 4 per cent. and then a 2 per cent. hydrochloric acid solution. He gives a description of the method as used at the Experiment Station of the Swedish Bog Culture Society and of the method of interpreting the analytical results. For ordinary purposes, quantitative analyses are made of the organic matter, of the residue left after ignition and of the calcium and nitrogen content, together with qualitative tests for substances injurious to plants, and the volume weight of the peat. At the same time, botanical, geological, macroscopical, and microscopical studies of the peat are made.

CLASS XII.—Miscellaneous Abstracts.

Manufacture of Moulded or Compressed Articles From Peat. R. Pearson and H. S. Stoneham, London, England. Br. Pats. 1046, Jan. 14, and 3130, Feb. 7th, 1911.

Wet peat is placed in a digester and heated by the introduction of steam at 50 lb. per sq. in., for 15 minutes or longer. The peat is now separated in a filter press, the liquid being used again in the digester. The peat-cake is then dried in steam-heated pans, and ground to powder, and any fibrous portions are separated by screening. The powdered peat is mixed with one-third of its weight of powdered glue, and warmed and moistened by means of steam. The moist mass is then moulded in the desired form under a pressure depending on the density and hardness required. Pliable articles are made by adding glycerine before moulding. Finally the articles are exposed to formaldehyde vapor in order to render the glue insoluble. The articles which may be made include boards or

slabs, buttons, door-knobs, fingerplates, candlesticks, screws, etc. By using glycerine a material resembling leather can be obtained.

H. P.

(From Jour. Soc. Chem. Ind. 30, 1207.)

The Use of Peat for Fuel and Other Purposes. Charles A. Davis. Bulletin No. 16, Bureau of Mines, Washington, D. C., 214 pp., 1 Map. To be obtained by applying to the Director, Bureau of Mines, Washington, D. C. A popular handbook on the occurrences and uses of peat.

The Peat Industry. The Irish-American Peat Association; Irish Industrial Journal, Nov. 25, 1911, and following issues.

A series of short, forcible articles describing the methods which the authors of the papers think have really demonstrated their usefulness, and calling the attention of the Irish people to better ways of preparing their peat fuel than those in use at present. These papers make a valuable addition to the literature of practical peat utilization, of which there is too little in English.

C. A. D.

Peat Production for 1910. Charles A. Davis.

Advance chapter from Mineral Resources of the United States for the calendar year 1910, p. 12, U. S. Geological Survey, Washington. Abstract in Mining and Engineering World, Oct. 28, 1911, p. 861. (This paper may be had by applying to the Director, U. S. Geological Survey, Washington, D. C.)

Canadian Peat Bogs. Engineering, 92 (1911), p. 744.

Cites and briefly abstracts a paper from the Canadian Engineer. The area of Canadian peat deposits is given as about 36,000 square miles, from which 28,000,000,000 tons of air-dried peat fuel could be made, equal to at least one-half as much coal. The paper then briefly describes the Department of Mines peat fuel plant at Alfred.

C. A. D.

Undeveloped Wealth in Peat Bogs. Oil, Paint and Drug Reporter, Oct. 16, 1911, p. 17.

A short article of general nature.

Peat Molasses Stockfood With the Addition of Alkali. E. Joseph. Zeits. fur Angew. Chem. (1911), p. 1977.

Notice of a German patent.

The American Peat Society. A. G. Forward, The Power House, 4, (1911), p. 314.

A report of the annual meeting of this society at Kalamazoo, Sept., 1911.

Peat Bogs Neglected as a Source of Wealth. Frank H. Madison. *The Illinois Statesman*, Aug. 12, 1911, one ill.

A general discussion of the uses of peat, with an account of the various ways of preparing it for fuel. The plant of the Springfield Filler Company, at Manito, Ill., is described and an outline is given of the proposed plans of the new plant to be put in operation near Morrison, Ill., some of which are novel. The article is the first that has come to the attention of the Editor dealing with Illinois peat.

The Uses of Peat as Fuel. *Electrical Record*, 11 (1912) 1-2.

Short editorial calling attention to Bureau of Mines Bulletin No. 16, with a short abstract.

Peat Development. *The Royal Gazette*, St. Johns, N. F., Vol. 104, Nos. 33, 34, 35, 36 (Aug. 15, 22, 29, Sept. 5, 1911).

A continuation of the series of articles mentioned in a previous number of this Journal. The author, in these articles, treats with the same vigor and enthusiasm as in his former contributions, although somewhat less convincingly, the subjects of gasification of peat, peat coke, and gasification with ammonia recovery. He points out some practical difficulties which he is certain would arise if large operations were undertaken, and ends this section of his discussion with a plea for the small peat plant for making a few thousand tons of ball peat fuel a year, and advises letting the large gas power plants wait until the need for them has become more evident. The last section of the series discusses at length the portable trackless peat plants of American and Canadian design, pointing out difficulties that must be overcome in their use that seem insurmountable to the author. The whole series of papers contains much that is worthy of the consideration of every one interested in peat exploitation, and it is unfortunate that the articles are not more accessible to the average reader. C. A. D.

The Conquest of Peat Deposits. M. Melchert (*Magazin für Technik und Industrieller Politik*, 1911, p. 7.) The article contains much that is already known, but the following paragraph is of interest: —The calculation has been made to show that by gasification of peat, with the utilization of its by-products, power can be procured cheaper than by either use of coal or water power. This calculation is perfectly plausible. However, the correctness of it will soon be determined by its actual practical use, and then the ever increasing danger of the exhaustion of the coal supply can be dismissed as a remotely possible calamity. Today industries are wandering from the coal mines to the centers of water power. In the future they will wander chiefly to the peat deposits. H. P.

Treatment of Peat or Other Substances to Be Dried By Pressing. T. Franke, Wiesbaden-Biebrich, Germany. Eng. Pat. 10,418, Apr. 28, 1910. The peat is mixed with one-tenth to one-sixth of its quantity with hard material, as stones, iron filings, etc., and the moisture is then pressed out. The idea is to distribute the pressure evenly through the mass. The briquets thus made are glazed and ready for use. H. P.

The Monthly Peat Reports of the Peat Association of Canada. Vol. I, No. 1, Sept., 1911. Published by the Society at Montreal, Canada; 12mo., 16 pages. (Souvenir and Presentation Number to commemorate the organization of the Association.) Contents: 1. Statement of the Aims of the Organization. 2. Sweden's Production of Peat. (An abstract of the Annual Report of the Swedish Government Peat Engineer, Alfred Larson.) 3. What is New in Peat? (Notes on the peat situation in Canada, United States, Great Britain and Ireland, Germany, Sweden and Holland.) 4. Smokeless Peat Fuel. Describes a new method of extracting water which makes combustion complete. 5. Quotations for Peat Litter and Peat Mull.

The Journal of the Canadian Peat Society, Vol. I, No. 1., November, 1911. Published quarterly by the Society, Ottawa, Canada; 8vo., 35 pages, \$1.00 per annum. Contents: 1. Address by Hon. Clifford Sifton, Chairman of the Commission of Conservation. 2. Power Production from Peat at the Government Fuel Testing Plant. 3. The Dorchester Peat Briquetting Plant. 4. The Improved Anrep Machinery for the Manufacturing of Machine Peat. 5. European Peat Societies. 6. Proceedings of the First General Meeting. 7. Editorial.

We welcome these two new periodicals most heartily, and hope in the next issue to give full abstracts of the more important articles which they contain.

Bulletin of the Canadian Peat Society. Published by the Society, Arthur J. Forward, B. A., Secretary-Treasurer, Ottawa, Canada. Contents: 1. The Possibilities of Canadian Peat, an address by Dr. Eugene Haanel, Director of Mines, Ottawa, Ont., before the Toronto Canadian Club, on Feb. 6th, 1911. 2. Experience in the Use of Peat Fuel from the Government Plant at Alfred, Ontario. Extracts from about 150 letters received in reply to circulars sent out by the Society to those who had purchased and tried the peat fuel made at Alfred.

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Nos. 3 and 4

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Devoted to the Development of American Peat Resources

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OBJECTS AND FOUNDATION.

Founded at the Jamestown Exposition on October 23d, 1907. Its object is to further the interest in the uses and application of peat for industrial and economic purposes.

PUBLICATIONS.

The Society holds one general meeting per year, and publishes a Journal quarterly, which is sent free to all members in good standing. The journal includes the proceedings of the meetings, original papers on practical experience, etc., also abstracts on all contemporary literature and patents, thus all the latest agricultural uses, fertilizer purposes, drainage, fuel uses, technical uses, etc.

SOME ECONOMIC POINTS OF INTEREST.

Prof. Chas. A. Davis, U. S. Bureau of Mines, estimates that there are about 12,000 sq. miles of workable peat beds in the United States, outside of the large number of beds very advantageously adapted for agricultural purposes, etc. He gives as a conservative average estimate a yield of 200 tons dried peat per acre foot.

Canada has at least 37,000 sq. miles of known peat deposits.

The U. S. Geological Survey reports that in 1906 \$45,344 worth of peat moss was imported from Europe.

About ten million tons of peat fuel are used in Europe every year.

GENERAL INFORMATION AND ENQUIRIES.

All members have the privilege of making enquiries regarding general information about peat and its uses, by addressing the Secretary of the Executive Committee.

It must be understood that only general information and of a general character can be given. Members can obtain the names of experts in any special line, from the Secretary of the Executive Committee.

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